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CATALOGUE OF  
"MACHINE TOOLS."

HILL, CLARKE & CO.

DEALERS IN

**IRON WORKING MACHINE TOOLS  
AND MACHINE-SHOP SUPPLIES.**

156 TO 164 OLIVER STREET, BOSTON, MASS.

*Corner Purchase Street,*

AND

12 & 14 SOUTH CANAL ST., CHICAGO, ILL.

1893.

MCINDOE BROS.  
PRINTERS AND EMBOSSEERS,  
BOSTON.

Eng 1738.93.3

Scientific Lathe

JUN 20 1917

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A VERY COMPLETE INDEX WILL BE FOUND IN  
THE BACK PART OF THIS BOOK, PAGES 362-368.

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*Foreign customers are reminded that in America Lathes are described by the "Swing," which is one-half the English measure of "Centres." Thus, American 16-inch lathe is a lathe of 8-inch "centres."*

# PREFACE.

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WE here offer our friends our new Catalogue of 1893. It has been completely revised with the intention of making it a compendium of the most advanced American machine-tool produc-

Owing to constant changes due to improvements by manufacturers, tools when sold may be found to vary in dimensions from the figures given in this catalogue. When exactness in these dimensions is essential, we advise a special enquiry on the subject.

details of a machine shop. These are fully illustrated in our

"SMALL TOOL CATALOGUE,"

a very useful book of reference to the machinist, which will be mailed on request.



# PREFACE.

---

WE here offer our friends our new Catalogue of 1893. It has been completely revised with the intention of making it a compendium of the most advanced American machine-tool productions from which a complete outfit for any ordinary shop could be selected with the certainty of having tools of the most modern and efficient character.

The machines described are from shops of acknowledged reputation and experience; many of these have never before been illustrated. Of some we control the whole production or are exclusive Selling Agents; and in all cases we sell at the manufacturers' lowest prices.

HILL, CLARKE & CO.

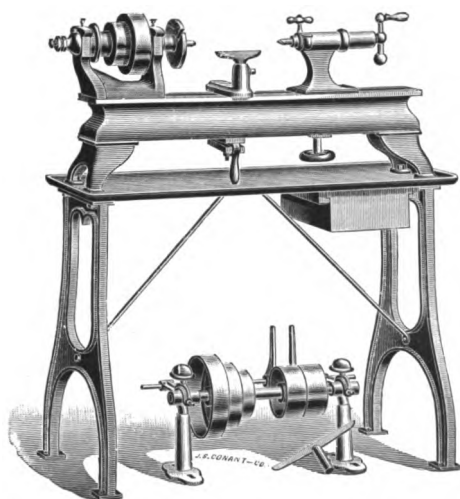
HAMILTON A. HILL.  
HENRY W. CLARKE.  
HENRY PICKERING  
CHARLES A. CLARKE.  
JOSEPH WAINWRIGHT.

In addition to the machine tools we sell, we carry a large stock of small tools as Vises, Chucks, Twist Drills, and the innumerable minor details of a machine shop. These are fully illustrated in our

"SMALL TOOL CATALOGUE,"

a very useful book of reference to the machinist, which will be mailed on request.

*Hand Lathe, 10 Inch Swing, 4 Foot Bed.*



*Price and description on opposite page.*



***W. F. Bancroft & Co. Hand or Speed Lathe******10 Inch Swing, 4 Foot Bed.***

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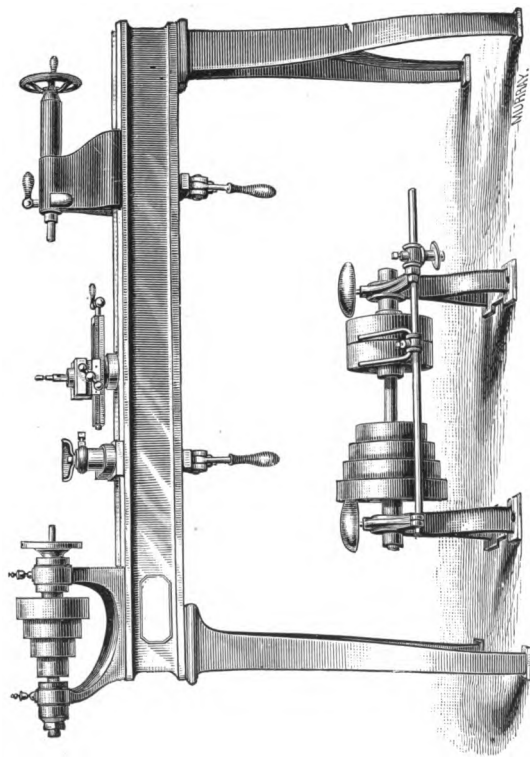
**T**HE cut on opposite page represents our 10-inch swing, Hand Lathe, with short legs mounted upon an Iron Table. This table serves as a receptacle for chips or oil, and is convenient for holding work or tools. The lathe is furnished with or without table as desired. Counter Shaft and T Rest, with two T's, accompany the Lathe. Has  $\frac{1}{2}$  inch hole through Head Spindle. Length of Bed, 4 feet; distance between Centers, 30 inches. Weight complete, with table, 285 lbs; without Table, 185 lbs. Screw and Lever Feed on Tail Spindle.

**Speed of Countershaft 425 Revolutions per minute. Tight and loose pulleys 5 inch diameter,  $2\frac{1}{4}$  inch face.**

---

**Price complete, as shown in cut . . . . \$**

*Hand or Speed Lathe, 12 Inch Swing, 5 Foot Bed.*



**These lathes are furnished with lever movement for tail spindle in addition to screw feed.**

*Price and description of this machine on opposite page.*

## *Hand or Speed Lathes.*

*Made for us by The Hendey Machine Co.*

**A**LL these Hand Lathes have hollow steel spindles. The boxes are fitted to tapering recesses, and are split so that any wear may be taken up by means of a nut on each end of the boxes. A plate for a slide rest is accurately fitted upon the ways. A substantial tool-shelf is securely fastened to the back of the bed upon iron brackets. Cam clamps are used to tighten tail-block and rest. The cones on both lathe and countershaft are of iron, have four steps, and cone on lathe is turned both outside and inside to secure a perfect balance and insure steadiness when running at a high rate of speed. A hand-lever, to facilitate quick drilling, is furnished without extra expense, in addition to hand wheel and screw. Back gears can also be furnished at moderate extra expense.

Speed of countershaft for hand lathes of course varies very much with different kinds of work, but the speeds given below we find about right for machine work.

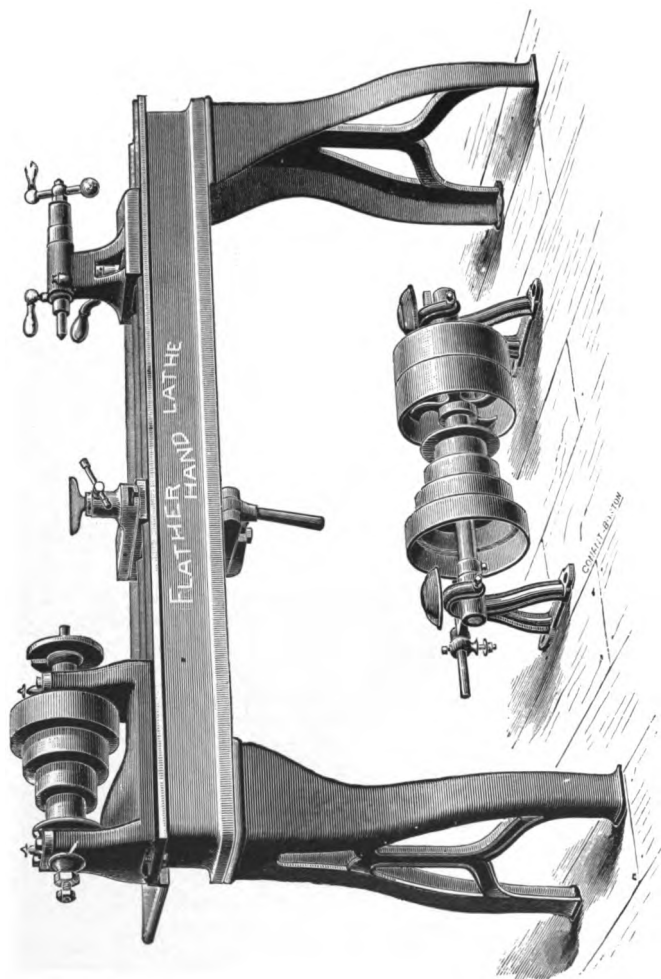
12-inch Hand Lathe, tight and loose pulleys  $8 \times 2\frac{1}{4}$ , about 300 revolutions  
 15-inch Hand Lathe, tight and loose pulleys  $10 \times 3$ , about 225 revolutions.

---

**Price, 10 inch swing, 4 foot bed, weight 300 lbs., \$**

"	12	"	"	4	"	"	"	450	"
"	12	"	"	5	"	"	"	500	"
"	12	"	"	6	"	"	"	550	"
"	15	"	"	6	"	"	"	700	"
"	15	"	"	8	"	"	"	800	"

*Flatber Hand Lathe, 14 Inch Swing, 6 Foot Bed.*



*Price and description of this machine on opposite page.*

## *Hand or Speed Lathe.*

*Made by Flather & Co.*

---

**S**WINGS 14 inches, 6-foot bed, takes between centres 3 feet 10 inches.

Weight, about 700 pounds.

Hole through head spindle,  $\frac{1}{8}$  inch diameter.

Width of belt,  $2\frac{1}{2}$  inches.

Tight and loose pulleys, 8 inches diameter, 3 inches face.

Speed of countershaft for iron work, 200 revolutions per minute, for brass work, about 500 revolutions per minute.

On the back of this Lathe is a very good size shelf for holding tools.

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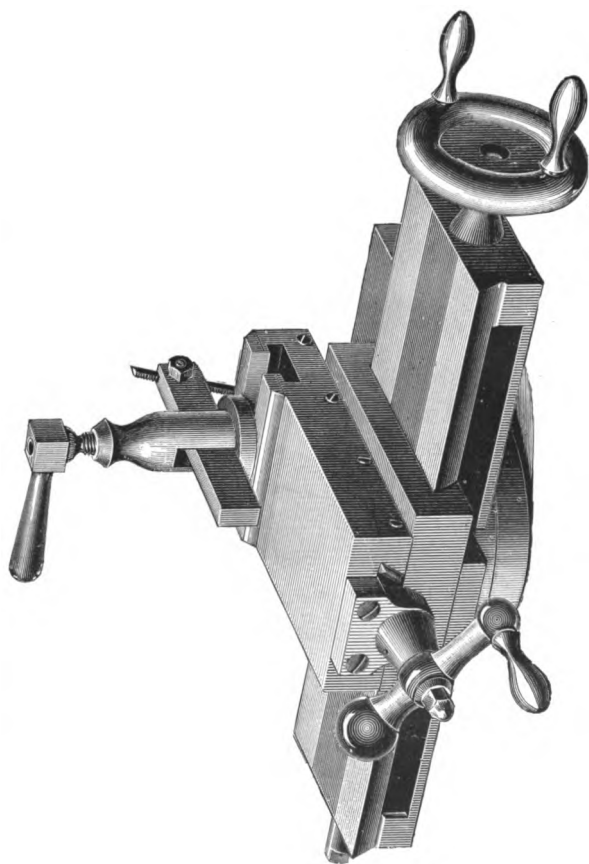
**Price, 14-inch swing, 6-foot bed . . . . . \$**

---

### *SLIDE REST.*

**14-inch swing, 15 inches long. Price, \$**

*Slide Rests for Hand or Speed Lathes.*



These slide rests can be fitted to lathes illustrated on pages 4, 6, and 8.

*Prices and description on opposite page.*

### *Slide Rests.*

THESE Slide Rests are made from new patterns, and are very strong and well proportioned in all their parts. The sliding surfaces are scraped and carefully fitted. The screws are all made of steel. The handles are made of a convenient shape and nicely finished.

All wearing surfaces have adjustable gibs for taking up wear.

The tool post has an arrangement for raising or lowering the tool, which can be quickly adjusted.

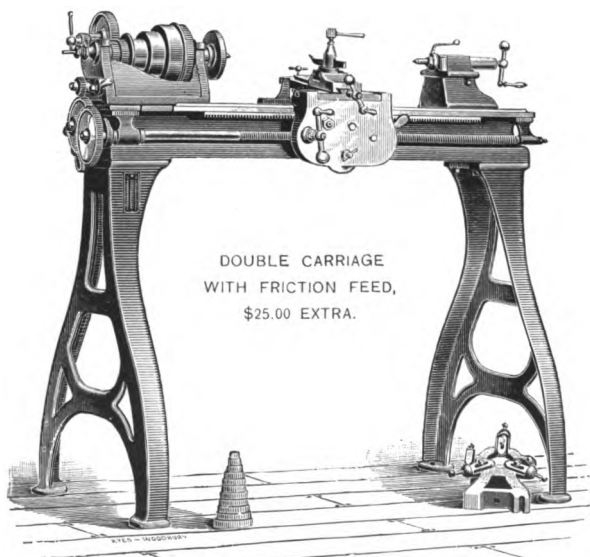
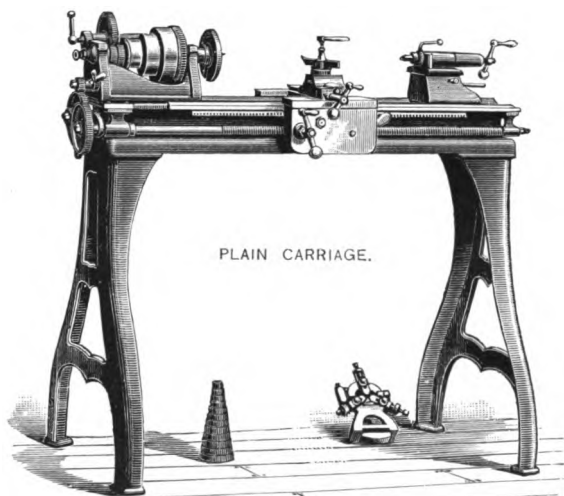
These slide rests are guaranteed to be first class, and to give satisfaction in every respect.

---

**Price (not including tools), 9 inch swing, 9 inches long, \$**

"	"	"	"	10	"	"	9	"	"
"	"	"	"	11	"	"	12	"	"
"	"	"	"	13	"	"	7½	"	"
"	"	"	"	14	"	"	15	"	"
"	"	"	"	15	"	"	10	"	"
"	"	"	"	16	"	"	15	"	"

## *Reed's Engine Lathes.*



*Prices and description of these machines on opposite page.*



## 10-Inch Swing Screw Cutting Engine Lathe.

*Made for us by F. E. Reed.*

**T**HIS Lathe is made with the best of workmanship and material; all gear teeth are accurately cut, and run smoothly and quietly. The head spindle has a half-inch hole through it, and is furnished with a finished plunger for starting out the centre. The cone pulley has three changes for  $1\frac{1}{2}$ -inch belt, and the back gears give six turns of the cone to one of the spindle, which gives power for any work the Lathe will swing. The tail spindle screw is graduated in such a manner as to be worked to the  $\frac{1}{100}$  of an inch without other measurement.

The screw which moves the tool block is so graduated as to be worked to the  $\frac{1}{100}$  of an inch without the use of calipers.

Change gears to cut from 6 to 144 threads to the inch, all necessary wrenches, and centre rest, are furnished with the Lathe.

The foot motion is of the most approved design. Treadle is made to slide on the square rocker shaft, so it can be brought directly under the weight of the operator, at any point desired, and secured in place by two set screws. The crank is adjusted to give the desired stroke.

Speed of countershaft, 200 revolutions per minute. Tight and loose pulleys, 7 inches diameter, 2 inches face.

10-inch swing, 4-foot bed, will turn 28 inches in length.

Swing over carriage, 7 inches. Weight, 500 pounds.

Price . . . . . \$

10-inch swing, 5-foot bed, will turn 40 inches in length.

Weight, 525 pounds. Price . . . . .

11-inch swing, 5-foot bed, will turn 36 inches in length.

Swing over carriage,  $7\frac{7}{8}$  inches. Weight, 700 pounds.

Price . . . . .

11-inch swing, 6-foot bed, will turn 48 inches in length.

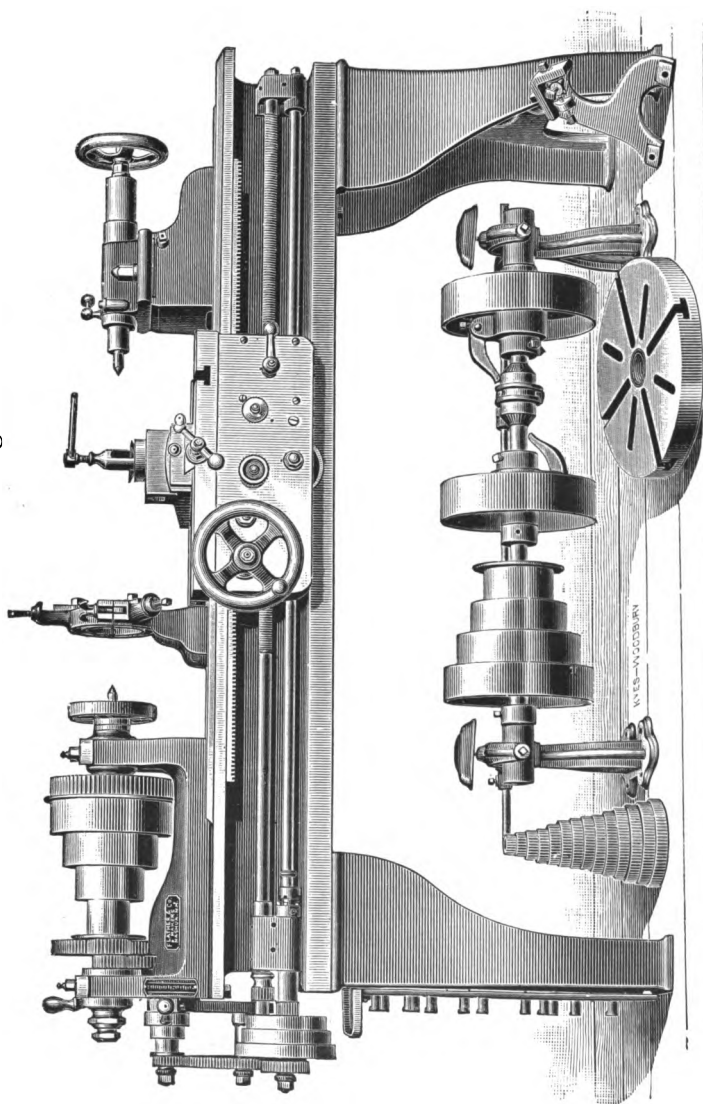
Weight, 740 pounds. Price . . . . .

Speed of countershaft, 200 revolutions per minute. Tight and loose pulleys, 8 inches diameter,  $2\frac{1}{4}$  inches face.

These Lathes can be furnished with either foot motion or countershaft at the same price.

Countershaft for foot power Lathe, extra, \$12.00.

*Flather's New Pattern Engine Lathe.*



**GENERAL DESCRIPTION OF THE FLATHER**  
***New Pattern Screw Cutting Engine Lathe.***

---

*Made by Flather & Co.*

---

**T**HIS Lathe is made to gauges, and its parts are interchangeable. The head stock has hard hammered steel spindle, and the bearings on spindle are ground perfectly true. They run in hard bronze boxes, which can be renewed at any time and be true with the rest of the Lathe. The carriage and tool slides have unusually long bearings. The screw and rod, which are of steel, are in front of the Lathe, and both run in the same casting. A short shaft, on which is mounted the feed cone and gears, is fitted in the long bearing in front of Lathe. With this shaft either the rod or screw can be instantly connected by clutch or slip gear. The short shaft can be driven either by belt or gear, and the change from one to the other is instantaneous. Thus the operator can use belt or positive feed at will, and change from one to the other. This gives him the opportunity of making the finishing cut of his cross feed work with great rapidity.

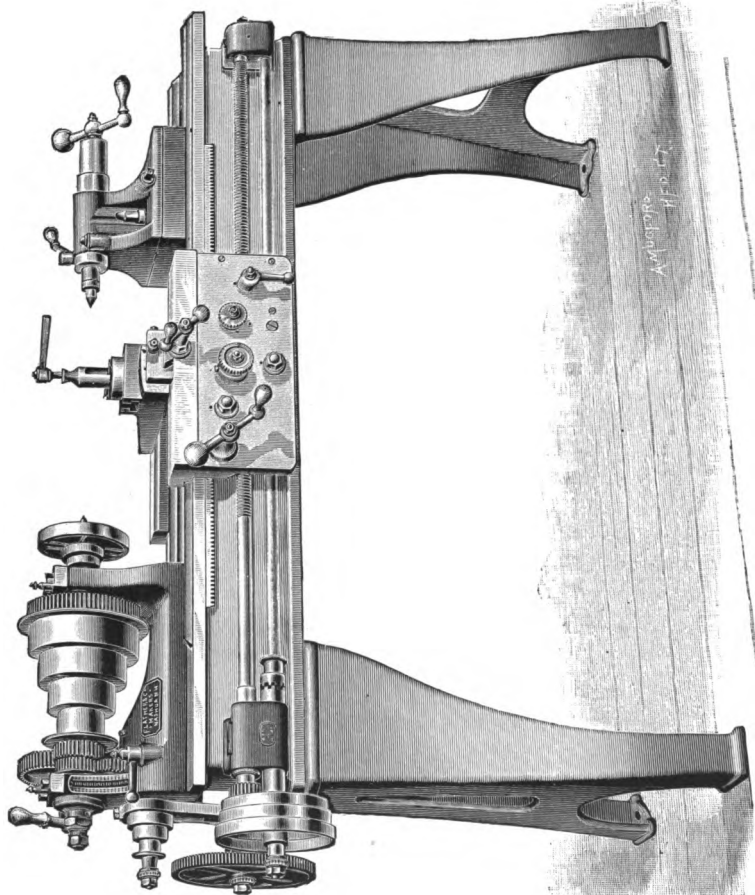
These Lathes have large holes through the spindles. They can be furnished with Taper attachment, also with a turret, exchangeable with the tail stock.\*

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*\*For details of these attachments see pages 26-27.*

*Flather Engine Lathe, 15 Inch Swing, 6 Foot Bed.*

WITH POWER CROSS FEED.



*Price and description of this machine on opposite page.*

## **14 and 15-Inch Swing Screw Cutting Engine Lathes.**

---

*Made by Flather & Co.*

---

**14-inch swing, 6-foot bed, will take 3 feet 6 inches between centres. Swing over flat carriage,  $8\frac{3}{4}$  inches; swing over double carriage, 7 inches.**

Flat carriage, as shown in cut on opposite page, has power cross feed.

Hole through head spindle,  $\frac{5}{8}$  inches in diameter.

There are four changes for feed belt giving a range of belt feeds from 53 cuts to 125 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 5 to 425 cuts to the inch. The screw has change gears to cut from 4 to 36 threads per inch.

**Speed of countershaft, 125 revolutions per minute. Friction pulleys, 10 inches diameter, 3 inches face. Weight, 1,200 pounds.**

---

**Price, 14-inch swing, 6-foot bed . . . . . \$**

---

**15-inch swing, 6-foot bed, will take 3 feet 4 inches between centres. Swing over flat carriage,  $9\frac{1}{4}$  inches; swing over double carriage,  $7\frac{1}{2}$  inches. Hole through head spindle,  $1\frac{1}{8}$  inches in diameter.**

There are four changes for feed belt, giving a range of belt feeds from 53 cuts to 123 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 5 to 425 cuts to the inch.

The screw has change gears to cut from 4 to 36 threads per inch.

**Speed of countershaft, 130 revolutions per minute. Friction pulleys, 10 inches diameter, 3 inches face. Weight, 1,400 pounds.**

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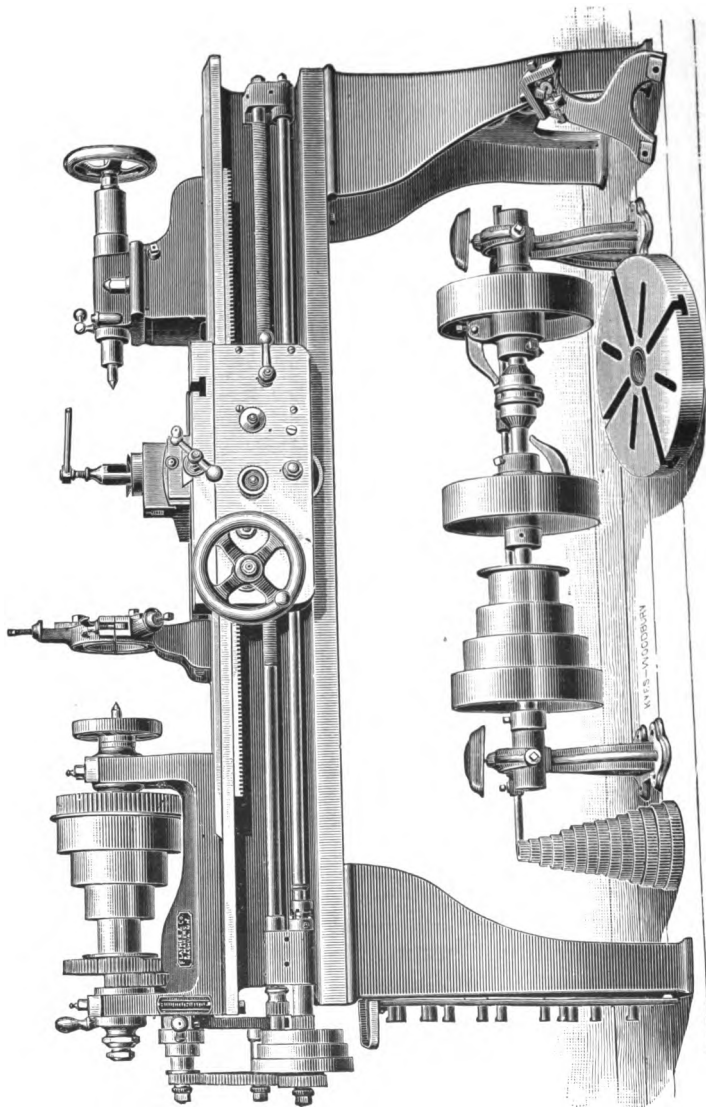
**Price, 15-inch swing, 6-foot bed . . . . . \$**

“ extra, per foot                      either size . .

“    “    for turret head            “    . .


“    “    “ taper attachment    “    . .

*Flatber Screw Cutting Engine Lathe, 16 Inch Swing, 6 Foot Bed.*



## 16-Inch Swing Screw Cutting Engine Lathe.

*Made by Flather & Co.*

 ON the opposite page is an illustration of this Lathe, with flat carriage and power cross feed. It is made also with compound or with rise and fall rest.

For general description of the Lathe and patent feed arrangement, see page 15.

**16-inch swing. 6-foot bed, will take 3 feet between centres. Swing over flat carriage. 10 inches; swing over double carriage, 7¼ inches. Hole through head spindle, 1¼ inches in diameter.**

There are four changes for feed belt, giving a range of belt feeds from 40 cuts to 90 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 4½ cuts to 400 cuts per inch.

The screw has change gears to cut from 4 to 36 threads per inch.

**Speed of countershaft, 120 revolutions per minute. Friction pulleys, 12 inches diameter, 3½ inches face. Weight, 1,650 lbs.**

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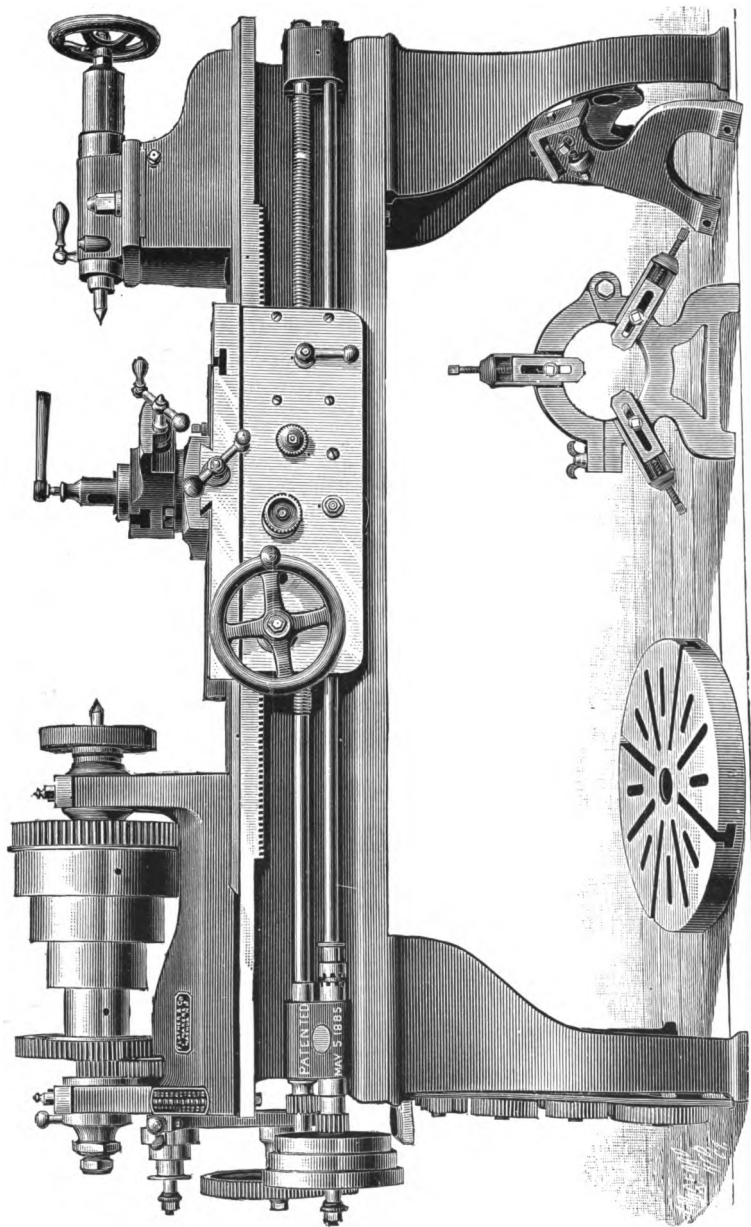
Price. 16-inch swing, 6-foot bed . . . . .	\$
“ extra per foot . . . . .	
“ “ for turret head . . . . .	
“ “ “ compound rest . . . . .	
“ “ “ taper attachment . . . . .	

This Lathe can be supplied with 2-inch hole in spindle at extra price.

---

*On page 26 is a back view of a Lathe with taper attachment.*

*Flather Screw Cutting Engine Lathe, 20 Inch Swing.*





## **18 and 20-Inch Swing Lathes.**

*Made by Flather & Co.*

18-inch swing, 8-foot bed, will take 4 feet 7 inches between centres. Swing over carriage, 12 inches. Hole through head spindle, 1½ inches in diameter.

There are four changes for feed belt, giving a range of belt feeds from 30 cuts to 75 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 4 cuts to 320 cuts per inch.

The screw has change gears to cut from 2 to 32 threads to the inch.

Speed of countershaft, 110 revolutions per minute. Friction pulleys, 12 inches diameter, 4 inches face. Weight, 2,400 pounds.

---

Price, 18-inch swing, 8-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for turret head . . . . .	
“ “ “ taper attachment . . . . .	

---

20-inch swing, 8-foot bed, will take 4 feet 5 inches between centres. Swing over carriage, 14 inches. Hole through head spindle, 1½ inches in diameter.

There are four changes for feed belt, giving a range of belt feeds from 30 cuts to 75 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 4 cuts to 320 cuts per inch.

The screw has change gears to cut from 2 to 32 threads to the inch.

Speed of countershaft, 110 revolutions per minute. Friction pulleys, 14 inches diameter, 4 inches face. Weight, 2,700 pounds.

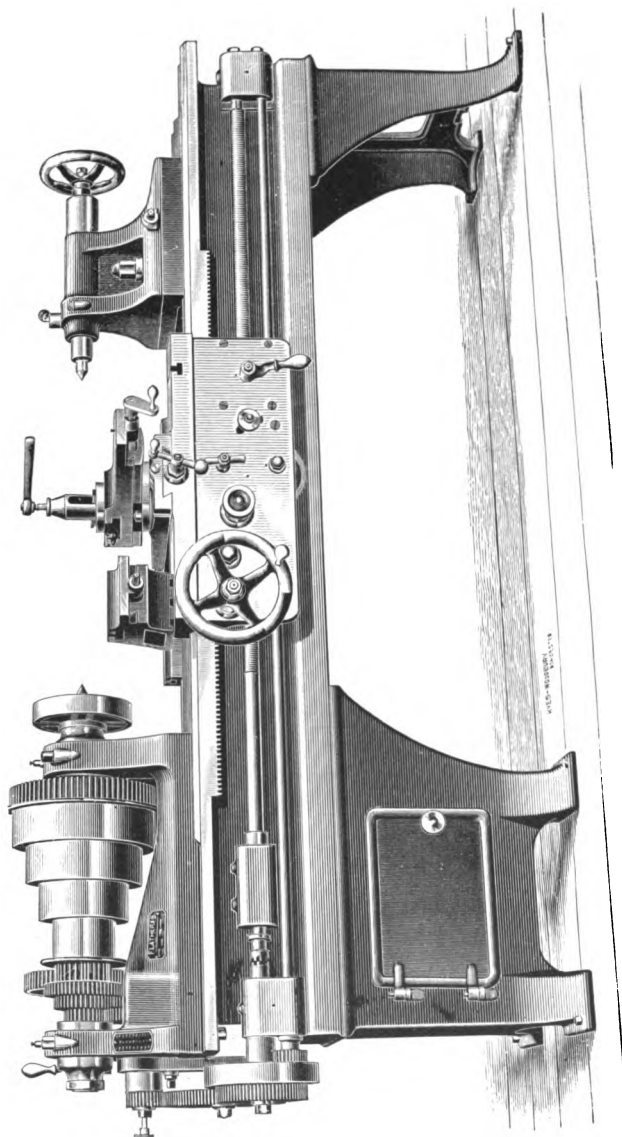
18 inch Lathe is made with plain flat rest, unless otherwise ordered. The 20-inch Lathe is made with compound rest. See cut.

---

Price, 20-inch swing, 8-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for turret head . . . . .	
“ “ “ taper attachment . . . . .	

---

*Flather Screw Cutting Engine Lathe, 22 Inch Swing, 8 Foot Bed.*



## *Flather Engine Lathe.*

### *22 Inch Swing.*

**T**HE cut on opposite page represents the Flather 22 inch Lathe.

The spindles are made of crucible steel forgings, ground true. The boxes are hard composition and interchangeable; when worn out can be replaced, and the alignment of lathe will be correct.

The Lathe has both belt and gear feeds. Inside the head stock, fastened on the spindle, are three gears of different diameters; on the feed shaft below are also three gears, running loose, of proper diameters to connect with gears on spindle. At the end of feed shaft there is no cone but a wide face pulley instead. The feed is connected and disconnected in any of the different gears by the knob at the end of the feed shaft. Three changes of feed can be had with the belt, also with any combination of gearing, and with the same change gears three different threads of screw can be cut, the changes being equal to having lead screw of 2, 4 and 8 threads per inch. The variations of feed are from  $\frac{3}{8}$  to one turn of lathe to 400 turns to the inch of feed.

The reversing of the feed is in the apron and the feed works are so arranged that the screw cutting and friction feed cannot both be engaged at the same time.

The tail stock is adjusted sideways with one screw which has means of taking up any wear or lost motion. There is also an index which is useful in determining the amount necessary to set the tail stock over in turning tapers.

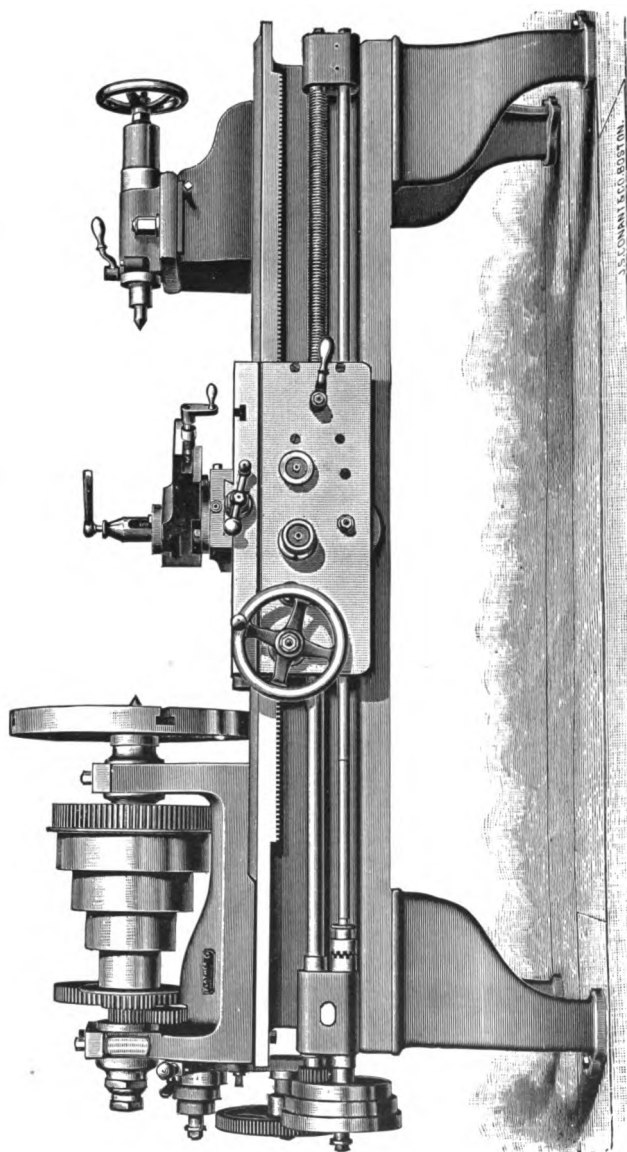
12 foot bed, 22-inch swing, takes 8 feet between centers. Swing over carriage, 14 inches. Hole through head spindle,  $1\frac{3}{4}$  inches in diameter.

The screw has change gears to cut from 1 thread in 2 inches to 32 threads in 1 inch.

Speed of countershaft 90 revolutions per minute. Tight and loose pulleys 16 inch diameter, 4 inch face.

# *Flatber Screw Cutting Engine Lathe, 24 Inch Swing, 8 Foot Bed.*

WITH COMPOUND REST AND POWER CROSS FEED



*Price and description of this machine, with attachments, on opposite page.*

## **24-Inch Swing Screw Cutting Engine Lathe.**

*Made by Flather & Co.*

**T**HE cut on the opposite page shows the general design of the Lathe; it has the patent feed described on page 15, and is built in large lots the same as the smaller sizes.

24-inch swing, 12-foot bed, will take 8 feet between centres. Swing over carriage, 16 inches. Hole through head spindle,  $2\frac{1}{8}$  inches in diameter.

There are four changes for feed belt, giving a range of belt feeds from 24 cuts to 45 cuts per inch; and a great many changes of gear feed (through the rod and friction), from 4 cuts to 220 cuts per inch.

The screw has change gears to cut from 1 to 16 threads to the inch.

Speed of countershaft, 90 revolutions per minute. Friction pulleys, 16 inches diameter, 4 inches face. Weight, 5,000 pounds.

---

Price, 24-inch swing, 12-foot bed . . . .	\$
“ extra, per foot . . . . .	
“ “ for taper attachment . . . .	

---

## **28-Inch Swing Screw Cutting Engine Lathe.**

**S**AME general design as the 24-inch Lathe.

28-inch swing, 12-foot bed, will take 7 feet 3 inches between centres. Swing over carriage, 18 inches. Hole through head spindle,  $2\frac{1}{8}$  inches in diameter.

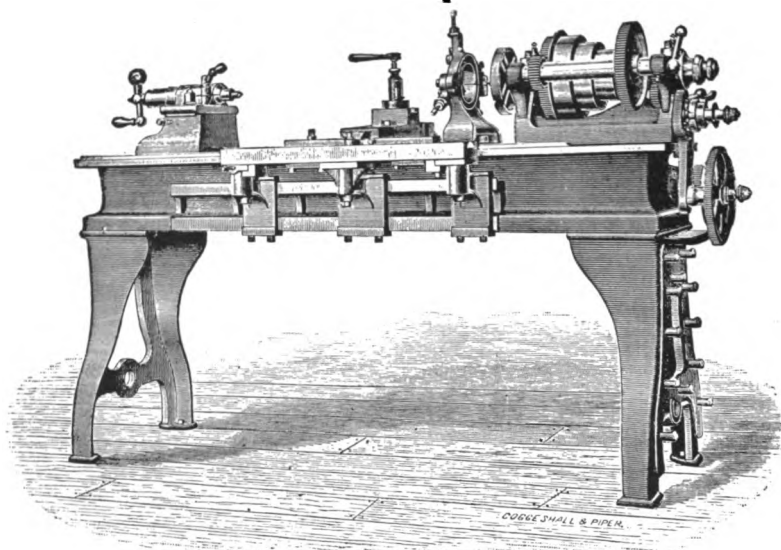
Speed of countershaft, 80 revolutions per minute. Friction pulleys, 16 inches diameter, 5 inches face. Weight, 6,000 pounds.

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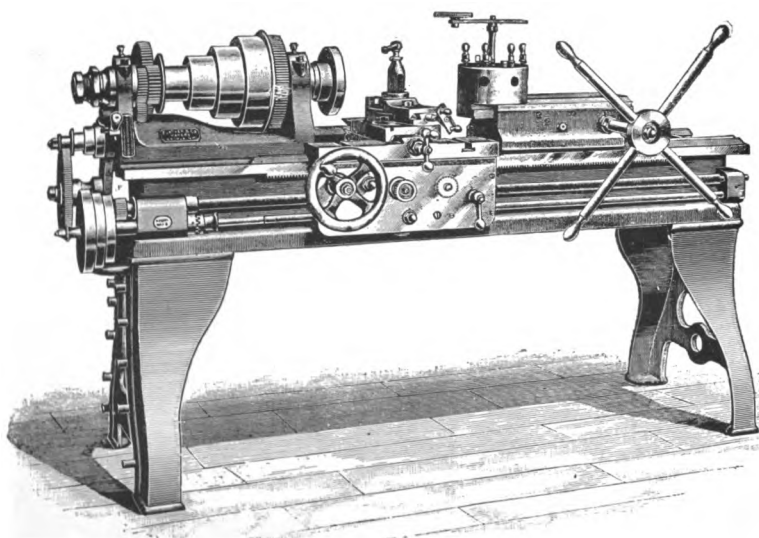
Price, 28-inch swing, 12-foot bed . . . .	\$
“ extra, per foot . . . . .	

---

*Flather Lathe, with Taper Attachment.*



*Flather Lathe, with Turret Attachment.*



### *Flather Taper Lathes.*

---

**T**HE cut on opposite page represents the back view of Flather's 15-inch Lathe with taper attachment.

All Flather's Lathes can be furnished with taper attachment. This attachment does not interfere with the ordinary operation of turning or screw-cutting. By it tapers can be turned on both outside and inside work, without setting the lathe centres out of line. It can be instantly connected or disconnected. The guide-bar is adjustable and is graduated, and has a movement from zero to 3 inches per foot. It is supported by three brackets, and is pivoted on the centre one. The brackets all move on slides that are cast on back of bed, and can be used at any point on the length of bed. The slide travelling in a longitudinal groove in guide-bar is connected with cross-screw in front of lathe by a rod that goes through a hole that is drilled out of solid the whole width of carriage. This arrangement insures a very solid and stiff attachment.

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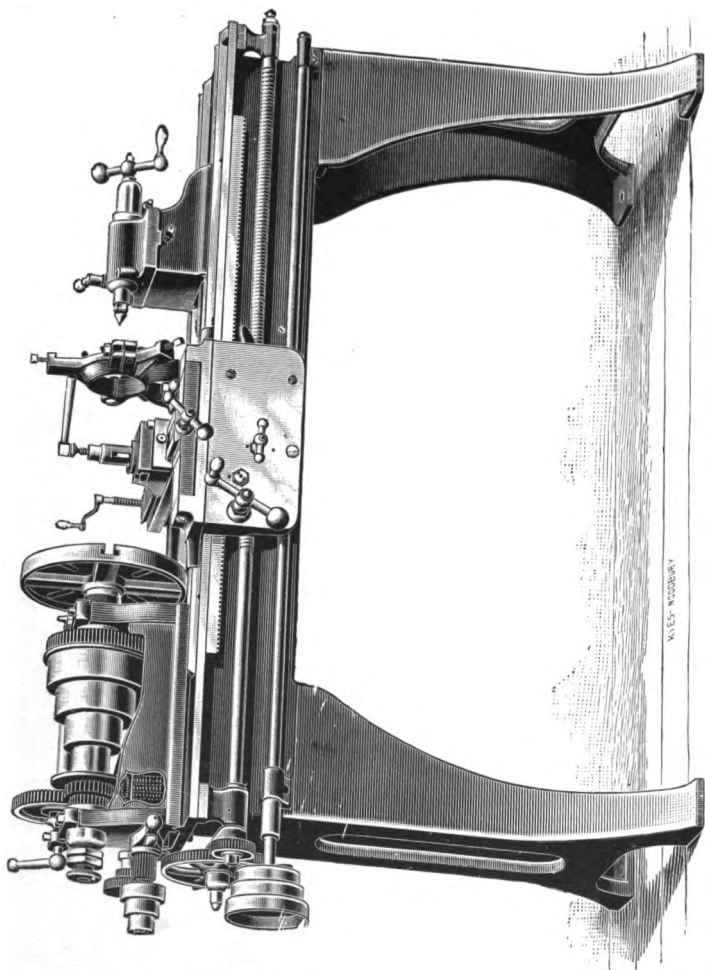
### *Turret Attachments.*

---

**T**HESE Turret Attachments of appropriate size can be supplied with any of the Flather Lathes. By sliding the tail stock off and replacing it with this attachment, a complete screw machine or turret lathe is at hand at a very small expense.

Prices of these two attachments are given in connection with the description of the various sizes of Flather lathes.

*Blaisdell Screw Cutting Engine Lathe,  
12 Inch Swing, 5 Foot Bed.*



*Price and description on opposite page.*



### *Blaisdell Engine Lathes.*

**T**HE high character and good workmanship of these tools is well known. The machines we here illustrate are most of them from new patterns just out and greatly improved as compared with those previously in the market.

---

### *Blaisdell Engine Lathe.*

*12 Inch Swing.*

---

**T**HE cut on opposite page represents this lathe with double carriage, having raising and lowering screw at the back.

12 inch swing, 6 foot bed, takes 3 feet 6 inches between centers. Swing over carriage, 5½ inches.

Cone takes 2 inch belt. Front bearing 1¼ inches diameter, 3½ inches long. Countershaft has 10½ inch pulleys, 2¼ inch face; should make 160 revolutions.

Hole through head spindle, ¾ inch diameter.

Weight on 6 foot bed, 995 pounds.

Price 12 inch swing, 5 foot bed . . . . . \$

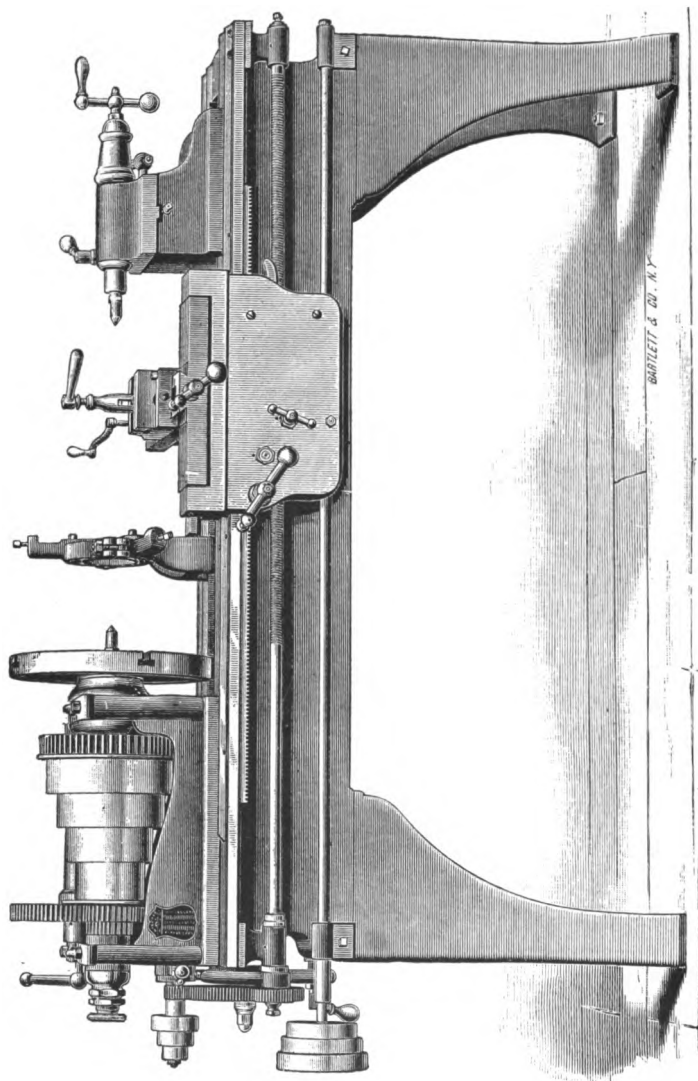
“ Extra per foot . . . . .

“ “ for taper attachment . . . . .

---

If lathes are wanted for plain turning only, deduct from list price, for screw and screw gearing, \$ ; if back gears are not wanted deduct from list price, \$

*Blaisdell Engine Lathe, 16 Inch Swing, 6 Foot Bed.*



*Price and description of this machine, with attachments, on opposite page.*

## 14 and 16-Inch Engine Lathes.

*Built for us by P. Blaisdell & Co.*

**14-inch swing, 6-foot bed, turns 3 feet 6 inches. Weight, 1,250 pounds.**

Can furnish either weight, gib, flat gib, or gib weight carriage. Gun-metal boxes furnished if desired.

Cones take 2-inch belt. Front bearings,  $1\frac{7}{8}$  inches diameter, 4 inches long. Dead spindle,  $1\frac{1}{2}$  inches diameter. Countershaft has 10 inch pulleys,  $2\frac{1}{4}$ -inch face; should make 160 revolutions.

These lathes can be furnished with  $\frac{3}{4}$ -inch hole in spindle.

---

<b>Price, 14-inch swing, 6-foot bed . . . . .</b>	<b>\$</b>
“ extra, per foot . . . . .	
“ “ for power cross feed . . . . .	
“ “ “ hollow spindle . . . . .	
“ “ “ taper attachment . . . . .	

---

**16-inch swing, 6-foot bed, turns 2 feet 9 inches. Weight, 1,700 pounds.**

Can furnish either weight, gib, flat gib, or gib weight carriages. (See cut of 18-inch lathes for gib carriages.)

Gun-metal boxes furnished if desired.

Cones take  $2\frac{1}{2}$ -inch belt. Front bearings,  $4\frac{1}{2}$  inches long,  $2\frac{1}{4}$  inches diameter. Dead spindle,  $1\frac{1}{8}$  inches diameter. Countershaft has 11-inch pulleys, 3-inch face; should make 150 revolutions.

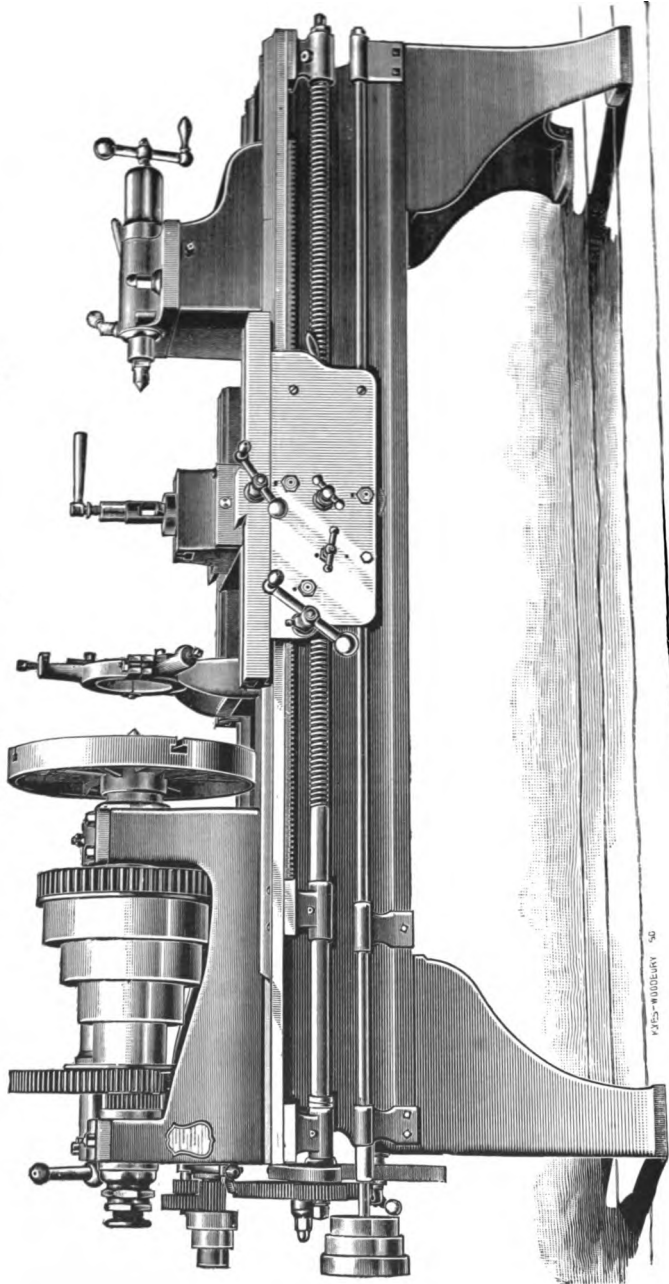
Can furnish these lathes with  $1\frac{1}{4}$ -inch hole in spindle.

---

<b>Price, 6-foot bed, 16-inch swing, . . . . .</b>	<b>\$</b>
“ extra, per foot . . . . .	
“ “ for hollow spindle . . . . .	
“ “ “ taper attachment . . . . .	

---

*Blaisdell Screw Cutting Engine Lathe, 22 Inch Swing, 10 Foot Bed.*



## 18 and 22-Inch Engine Lathes.

*Built for us by P. Blaisdell & Co.*

**18-inch swing, 8-foot bed, turns 4 feet 6 inches. Weight. 2,400 pounds.**

Front bearings,  $2\frac{3}{8}$  inches diameter and 5 inches long. Dead spindle,  $2\frac{1}{8}$  inches diameter. The gib carriages on all the lathes are firmly secured to bed by means of three gibs. Cones take  $2\frac{3}{4}$ -inch belt.

Can furnish these lathes up to 12 feet long. Can furnish either weight, gib, gib weight, flat gib, or compound rests; power cross feed included. Countershaft has 12-inch pulleys, 3-inch face; should make 150 revolutions.

Can furnish these lathes with  $1\frac{7}{16}$ -inch hole in spindle.

---

Price, 18-inch swing, 8-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for hollow spindle . . . . .	
“ “ “ taper attachment . . . . .	
“ “ “ compound rest . . . . .	

---

**22-inch swing, 10-foot bed, turns 5 feet 4 inches. Weight. 3,500 pounds.**

Cones take 3-inch belts. Front bearings,  $3\frac{3}{8}$  inches diameter and 6 inches long. Dead spindle,  $2\frac{3}{8}$  inches diameter. Can furnish these lathes up to 16 feet, 22-inch lathes have power cross feed. Can furnish adjustable side block for pulleys; also, either gib, gib weight, flat gib, or compound rests, and gun-metal boxes. Countershaft has 14-inch pulleys, 4-inch face; should make 125 revolutions.

Can furnish these lathes with  $1\frac{1}{4}$ -inch hole in spindle.

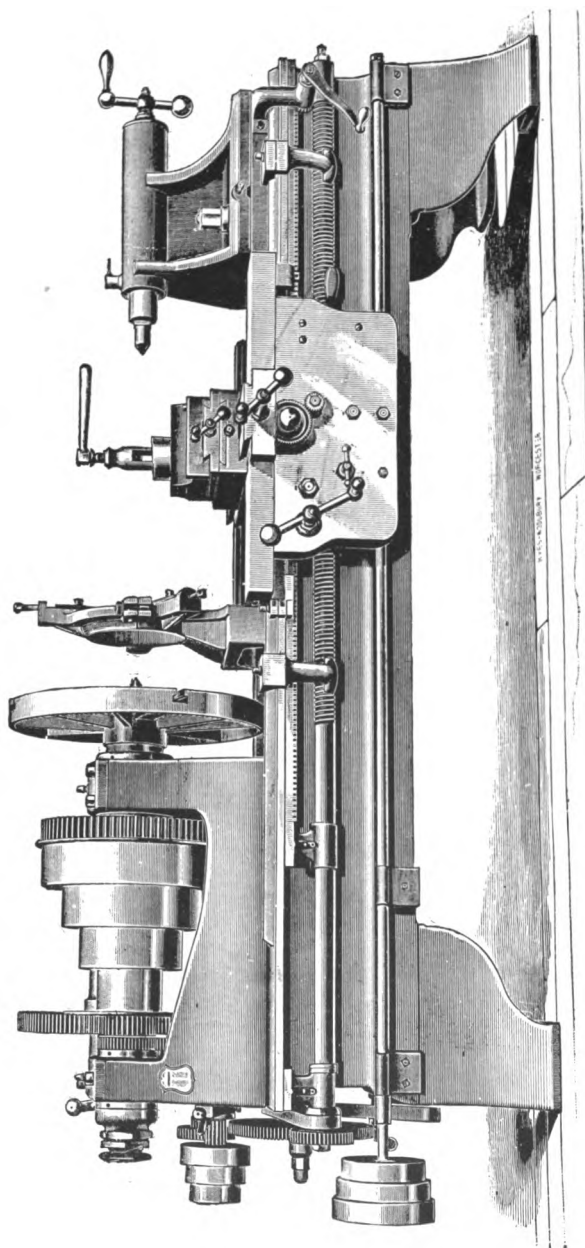
---

Price, 22-inch swing, 10-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for compound rest . . . . .	
“ “ “ hollow spindle . . . . .	
“ “ “ taper attachment . . . . .	

---


The cut on opposite page represents the 18-inch and 22-inch lathes, with gibbed carriage and power cross feed.

*Blaisdell Screw Cutting Engine Lathe, 24 Inch Swing, 12 Foot Bed.*



## 24 and 28-Inch Engine Lathes.

*Built for us by P. Blaisdell & Co.*

 N opposite page is cut representing these lathes, with power cross feed.  
24-inch swing, 12-foot bed, turns 6 feet 6 inches. Weight, 5,300 pounds.

Cones take 4-inch belts. Front bearings,  $4\frac{1}{4}$  inches diameter, 7½ inches long. Dead spindle,  $2\frac{7}{8}$  inches diameter. Countershaft has 16-inch pulleys, 4-inch face; should make 100 revolutions.

Can furnish these lathes with  $1\frac{7}{8}$ -inch hole in spindle.

These lathes will actually swing 26 inches.

---

Price, 12-foot bed, 24-inch swing, complete . . . \$

“ extra, per foot . . . . .  
“ “ for hollow spindle . . . . .  
“ “ “ taper attachment . . . . .  
“ “ “ compound rest . . . . .

---

28-inch swing, 12-foot bed, turns 6 feet 3 inches. Weight, 5,900 pounds.

Cones take 4-inch belts. Front bearings,  $4\frac{3}{4}$  inches diameter, 7½ inches long. Dead spindle,  $2\frac{5}{8}$  inches diameter. Countershaft has 16-inch pulleys, 4-inch face; should make 85 revolutions.

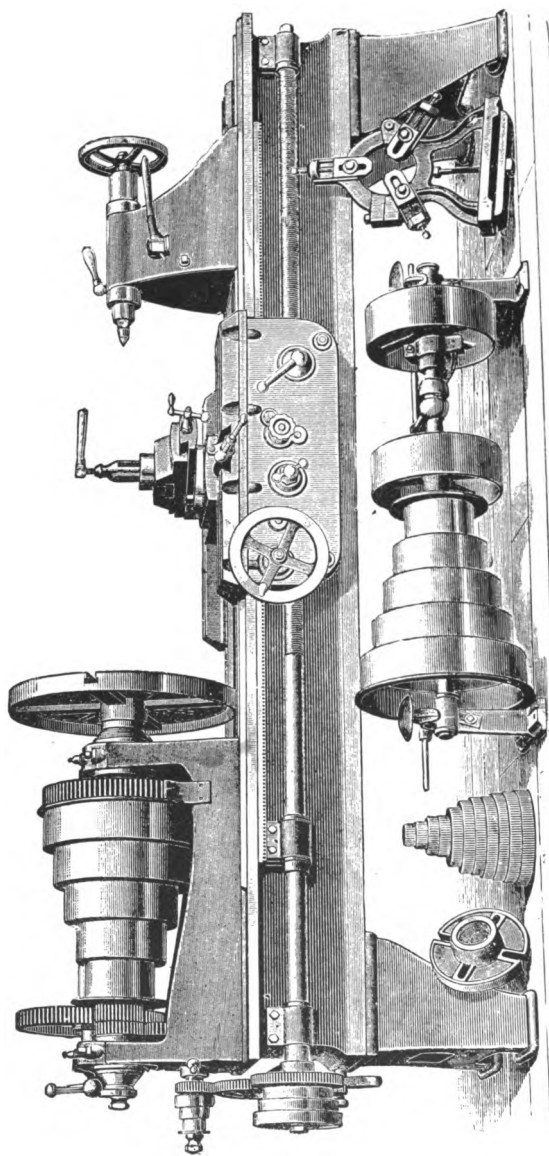
Can furnish these lathes with  $2\frac{1}{8}$ -inch hole in spindle.

---

Price, 12-foot bed, 28-inch swing . . . . . \$

“ extra, per foot . . . . .  
“ “ for hollow spindle . . . . .  
“ “ “ taper attachment . . . . .  
“ “ “ compound rest . . . . .

*Fay & Scott Screw Cutting Engine Lathe, 28-Inch Swing, 12 Foot Bed.*





*Fay & Scott 28 and 32-Inch Engine Lathes.*

**T**HE 28-inch lathe swings 28 inches over bed and 20 inches over carriage. Head spindle has a front bearing 4 inches in diameter and 7 inches long. Cone has 5 steps for 4-inch belt, (large step being 18 inches in diameter) and so proportioned in connection with powerful gearing as to have equal graduations of speed. Tail spindle is  $2\frac{3}{4}$  inches in diameter.

Feed is driven by slotted screw, with belt feed independent of gears, allowing either to be used for the purpose. Carriage is gibbed on front and back and has compound rest indexed, and power cross feed the full swing of the lathe with one setting of tool.

Aprons are double with long bearings for each end of shafts in same.

Countershaft has 14-inch friction pulleys which should run 110 revolutions per minute.

All sliding surface are carefully scraped no emery being used in making fits. Each lathe is belted up and thoroughly tested before leaving the shop, and is warranted to be first-class in every respect.

Each lathe is furnished with full change of gears for screw cutting, large and small face plates, centre rest, wrenches, etc. Any length bed furnished. Weight on 12-foot bed, 5,000 pounds.

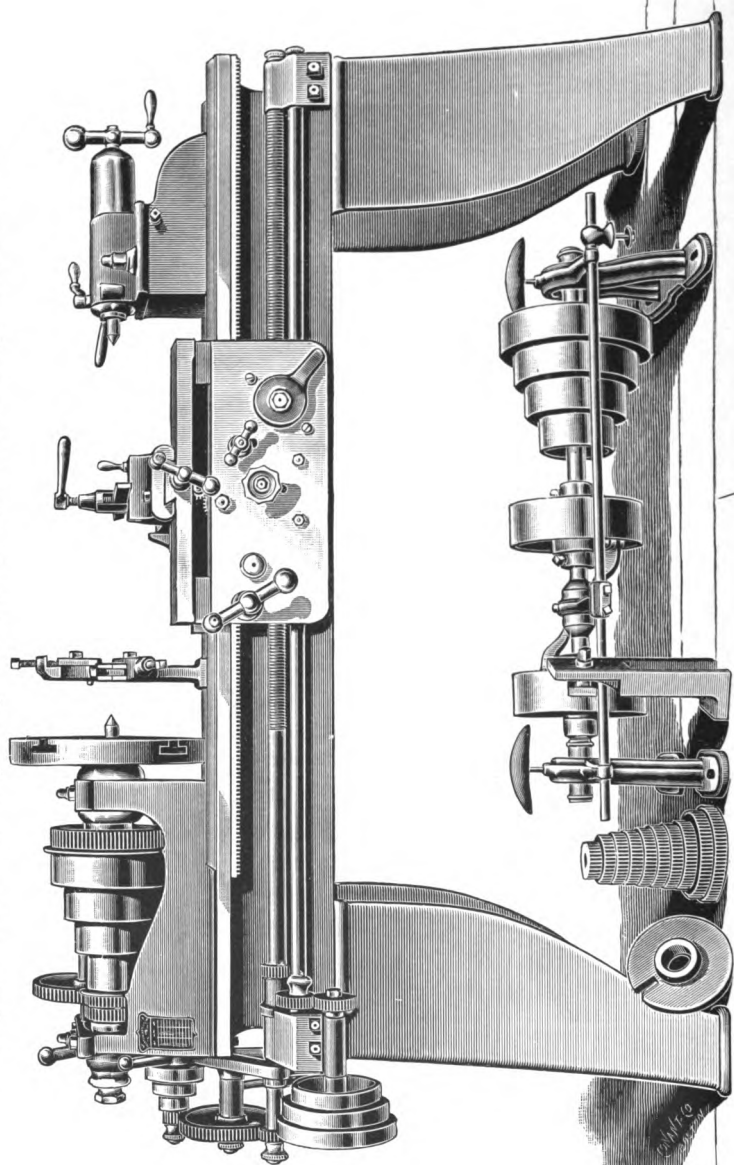
---

Price, 28-inch swing, 12 foot bed . . . . \$  
 " extra, per foot . . . . .

The 32-inch lathe is of similar style.

Price, 32-inch swing, 12-foot bed . . . . \$  
 " extra, per foot . . . . .

*Draper Screw Cutting Engine Lathe, 15 Inch Swing, 6 Foot Bed.*



## *The Draper Machine Tool Co.*

*Formerly the Lath & Morse Tool Co.*

**T**HIS Company is one of the oldest builders of machine tools in the country. It is now occupied in remodelling its productions, and as may be seen from the cut opposite will completely change them, bringing them up to the latest standard in weight, power and convenience. The old standard of workmanship will be fully maintained.

### *15-Inch Swing Engine Lathe.*

**T**HE cut opposite illustrates this tool.

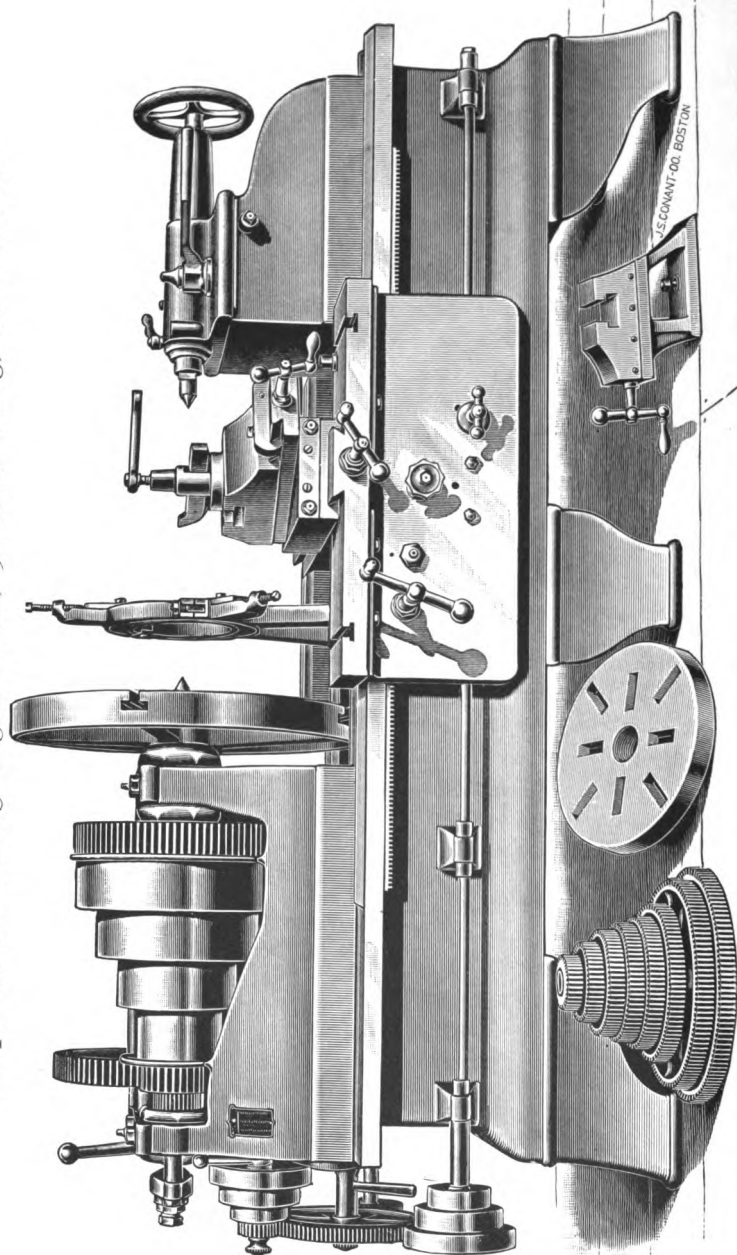
Spindle bearings,  $2\frac{1}{4}$  inches diameter,  $4\frac{3}{8}$  inches long. Belt,  $2\frac{1}{2}$  inches wide. Hole in spindle, 1 inch diameter. Length carriage on tracks, 20 inches. Rod feed driven by belt or gear at will. Weight, 6-foot bed, 1,650 pounds.

Size countershaft pulleys, 10 inches, 3-inch face. Revolutions of countershaft pulleys 130.

Price, 15-inch swing, 6-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for power cross feed . . . . .	
“ “ “ taper attachment . . . . .	
“ “ “ compound rest . . . . .	

Other sizes of the new style are in progress.

*Draper Screw Cutting Engine Lathe, 32 Inch Swing, 16 Foot Bed.*



***The Draper Machine Tool Co.***  
***32 and 36-Inch Screw Cutting Engine Lathe.***

**T**HIS Lathe is from new patterns and is a strictly first-class tool in workmanship and material, and is made either 32-inch or 36-inch swing. Its great weight and size of details make it a stiff and solid tool at the latter capacity.

16-foot bed, turns 11 feet. Countershaft has pulleys 16 inches, 5-inch face, and they should make 90 revolutions per minute.

**Weight, 16-foot bed, 7,500 pounds.**

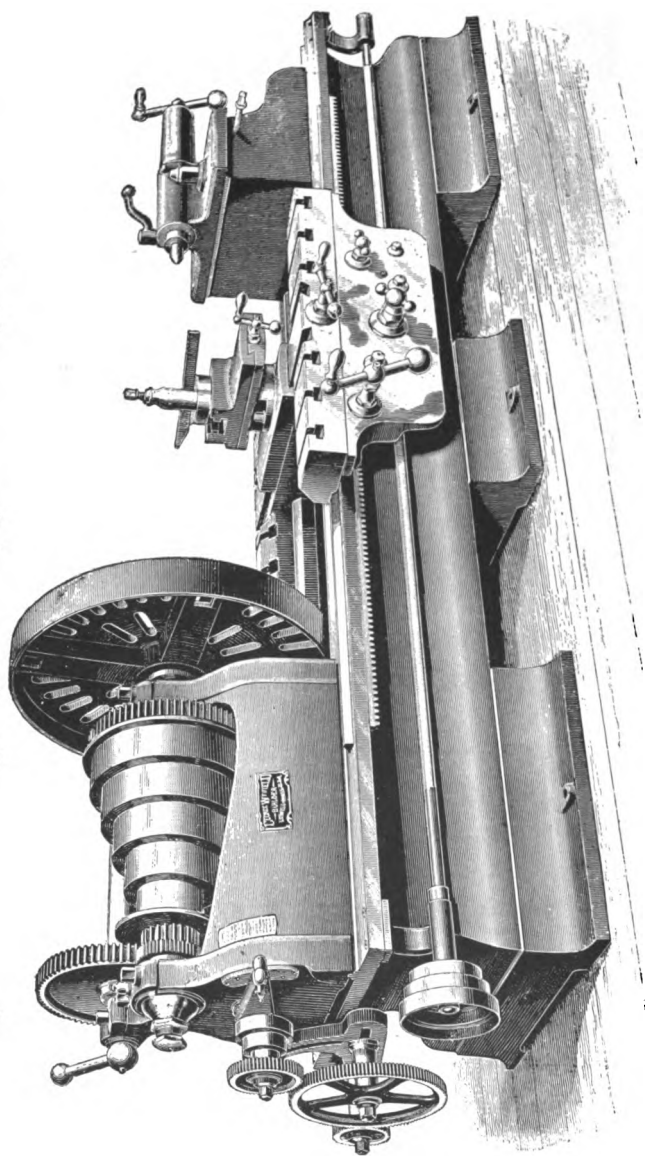
**Price, 32-inch swing, 16-foot bed, complete . . . \$**

“ extra, per foot . . . . .

**Price, 36-inch swing, 16-foot bed . . . . \$**

“ extra, per foot . . . . .

*Fifield Screw Cutting Engine Lathe, 38 Inch Swing, 14 Foot Bed.*



## ***Fifield Engine Lathes.***

*30, 38 and 50 Inch Swing.*

**T**HESE Lathes are of completely new design with all standard modern details.

30-inch Swing Lathe. Countershaft pulleys 16 x 4½ inches. Revolutions 100.

---

Price, 30-inch swing 12 ft. bed. . . . . \$

“ extra, per foot . . . . .

---

38-inch Swing Lathe, see cut opposite. Countershaft pulleys 20 x 6 inches. Revolutions 80.

---

Price, 38-inch swing 12 ft. bed. . . . . \$

“ extra, per foot . . . . .

---

50-inch Swing Lathe. Countershaft pulleys 24 x 12 inches. Revolutions 80.

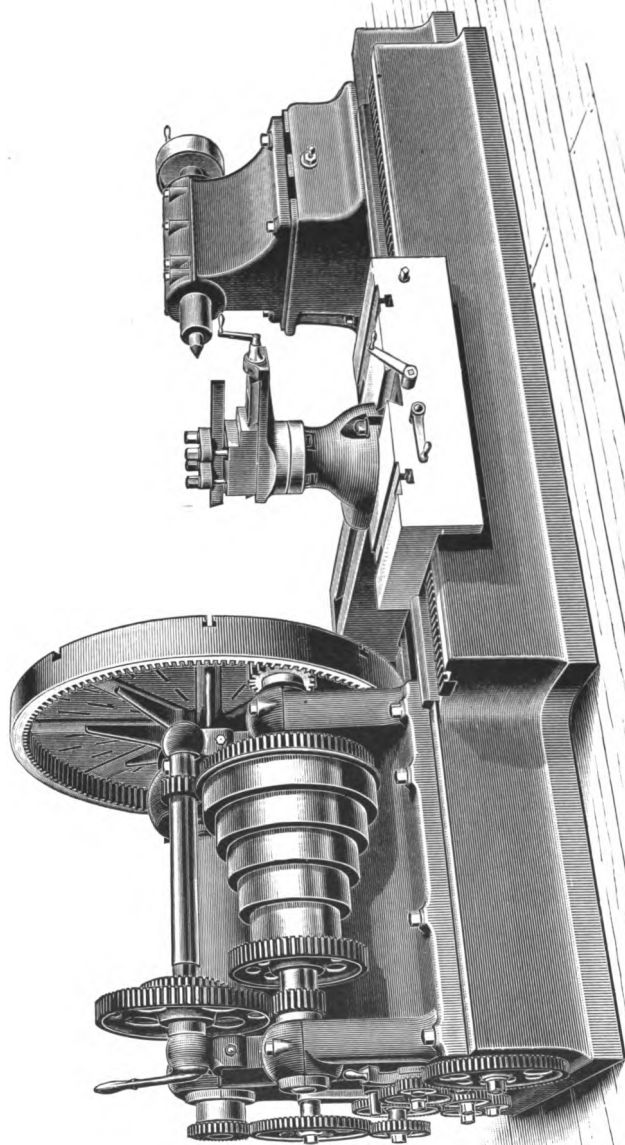
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Price, 50-inch swing 14 ft. bed. . . . . \$

“ extra, per foot . . . . .

“ “ triple gearing . . . . .

*82 Inch Swing, 20 Foot Bed.*





## *82 Inch Swing Lathe.*

CUT on opposite page represents a lathe adapted to general machine shop use.

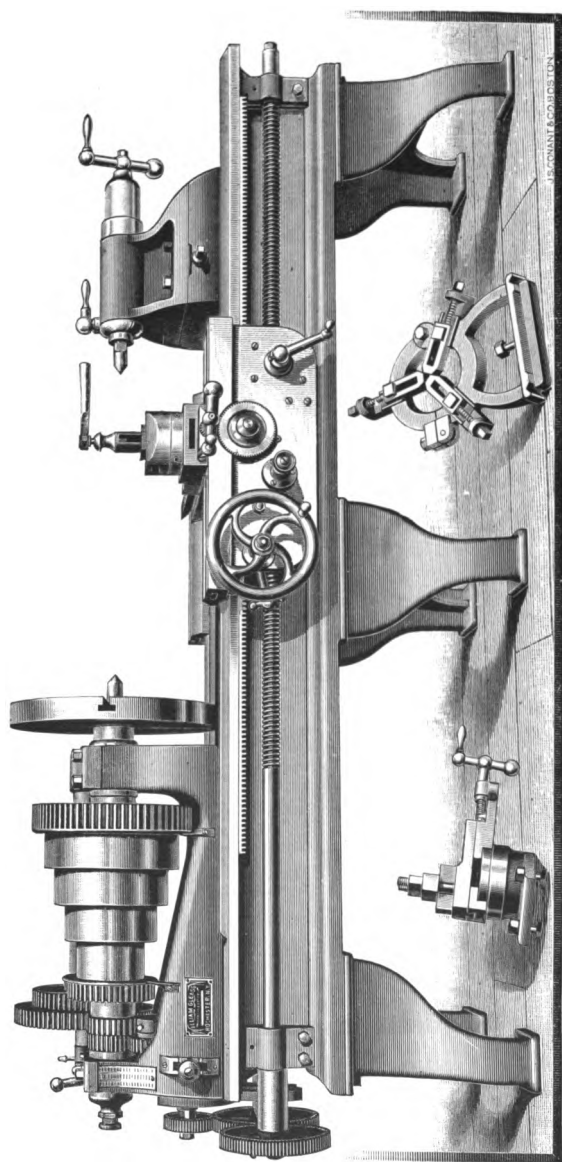
It is built by a machinist of large experience who intends to make a specialty of these lathes. The machine can be fitted with gears for screw cutting. Bed can be of any reasonable length and the tool can be furnished without tail stock to be used only for face work. Tail stock is fitted to receive splining attachment, if desired.

### **DETAILS.**

Swing 82 inches x 20 foot bed. Centres 8 feet. Spindle bearings 11 inches diam. x 14 inches long. Hole through spindle  $4\frac{1}{4}$  inches. Cones 14 to 28 inches diam. x  $5\frac{1}{2}$  inches face. Double geared and geared into face plate. Internal gears in face plate are cut. Slowest speed of cone shaft 7 to 1 of face plate. Tail stock 7-inch spindle. Tail stock has movement for splining of 15 inches. Countershaft pulleys 30 x 6 inches. Revolutions 154.

Price, 82-inch swing, 20-foot bed . . . . .	\$
“ extra, per foot . . . . .	
“ “ for screw cutting . . . . .	

*Gleason Screw Cutting Engine Lathe, 26 Inch Swing, 12 Foot Bed.*



*Price and description of this machine on opposite page.*

### ***Gleason Lathes.***

*Made by The Gleason Tool Co.*

**T**HESE tools are designed for heavy work and for shops like locomotive, engine building, forge and other such establishments requiring the most powerful class of machinery. They are from completely new patterns, and are designed to compete with any tools in the market.

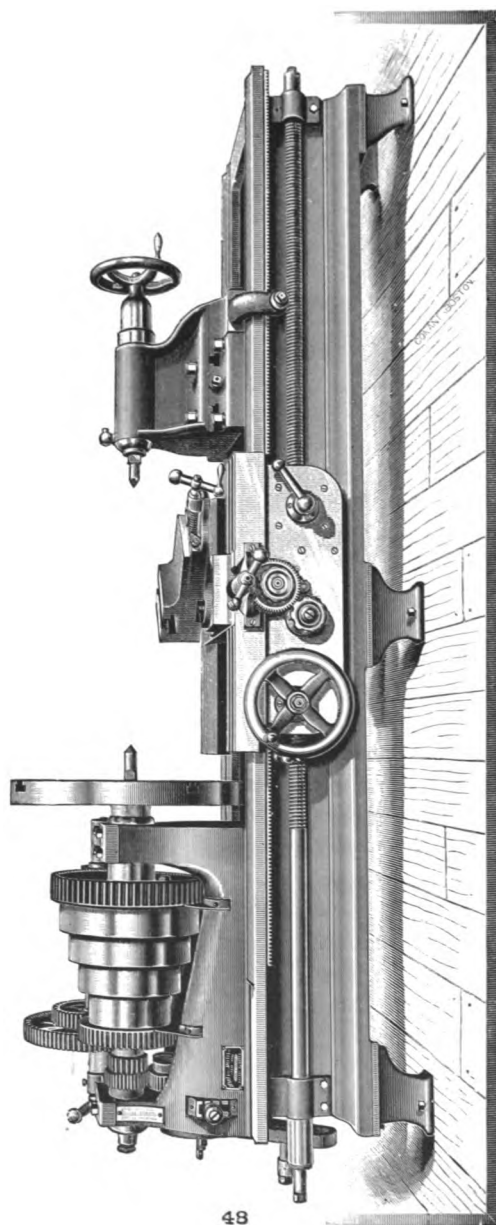
The smaller sizes have a double gear on cone and back shaft, giving 12 speeds to the spindle. This arrangement gives great power and a very uniform drop from belt to gear speeds. Lead screws are of steel—two threads to the inch—which enables the operator to run the carriage back on the rack and have the tool commence accurately on all even threads.

The 26, 32 and 38-inch lathes have the double gear described above. The 38-inch can be triple geared if desired. The 42-inch and larger sizes are triple geared.

The lathes are furnished with compound rest, small and large face plates, centre and follower rest, and change gears. Angular as well as cross feed is supplied as an extra to the 32 and 38-inch lathes. It is included in the price of the larger sizes.

*Gleason Screw Cutting Engine Lathe, 38 Inch Swing, 14 Foot Bed.*

WITH DOUBLE BACK GEARS, COMPOUND REST, AND POWER CROSS FEED.



48

*Price and description of this machine on opposite page.*

***Gleason Lathes.******26, 32 and 38 Inch Swing.***

26-inch swing, 10-foot bed, turns 5 feet. Swing over carriage 18 inches. Countershaft pulleys 16 x 7 inches. Revolutions 110.

---

Price, 26-inch swing, 10-foot bed . . . . . \$  
" extra, per foot . . . . .  
" " for taper attachment . . . . .

---

32-inch swing, 10-foot bed, turns 4 feet. Swing over carriage 20 inches. Countershaft pulleys 18 x 8 inches. Revolutions 120.

---

Price, 32-inch swing, 10-foot bed . . . . . \$  
" extra, per foot . . . . .  
" " for angular feed . . . . .  
" " " taper attachment . . . . .

---

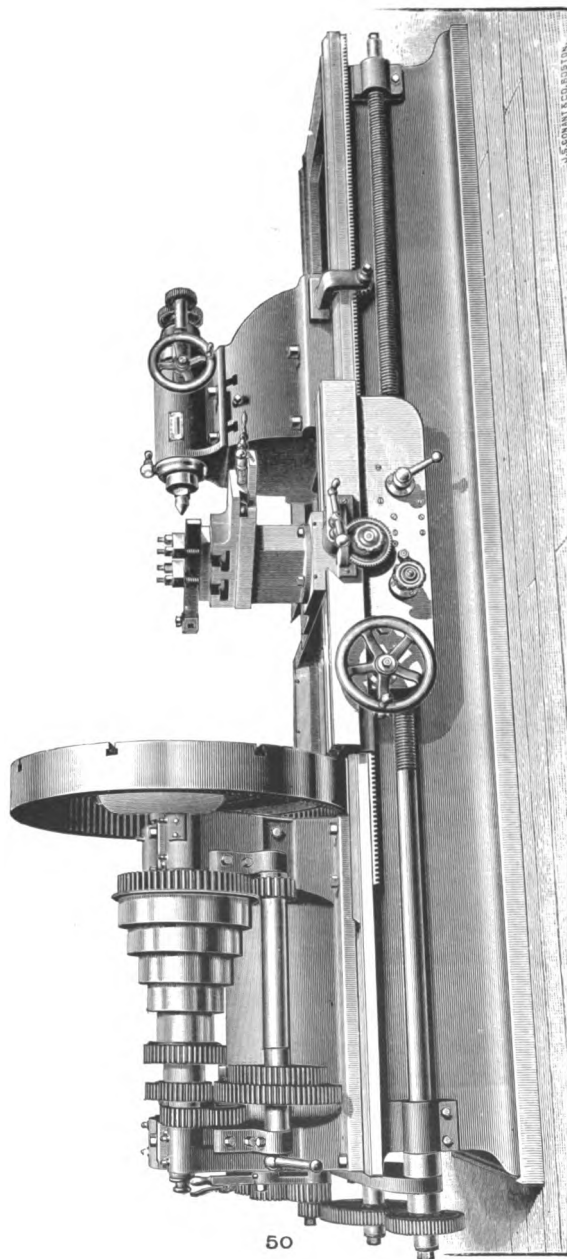
38-inch swing, 12-foot bed, turns 5¼ feet. Swing over carriage 24 inches. Countershaft pulleys 22 x 8 inches. Revolutions 140.

---

Price, 38-inch swing, 12-foot bed . . . . . \$  
" extra, per foot . . . . .  
" " for geared face plate . . . . .  
" " " angular feed . . . . .

*Gleason Triple Geared Engine Lathe, 60 Inch Swing, 16 Foot Bed, Cone on Side Spindle.*

THIS LATHE HAS COMPOUND TOOL BLOCK, WITH POWER CROSS AND ANGULAR FEEDS.



*Price and description of this machine on opposite page.*

### ***Gleason Lathes.***

*42, 48, 52, 60 and 72 Inch Swing.*

42-inch swing, 12-foot bed, triple geared, turns 5 feet. Swing over carriage 30 inches. Countershaft pulleys 22 x 8 inches. Revolutions 140.

---

Price, 42-inch swing, 12-foot bed . . . . . \$  
 " extra, per foot . . . . .

---

48 and 52-inch swing, 16-foot bed, turns 8 feet. Swing over carriage 34 and 36 inches. Countershaft pulleys 24 x 8 inches. Revolutions 150.

---

Price, 48-inch swing, 16-foot bed . . . . . \$  
 " 52 " " 16 " . . . . .  
 " extra, per foot . . . . .

---

60-inch swing, 16-foot bed, turns 7 feet. Swing over carriage 42 inches. Countershaft pulleys 24 x 10 inches. Revolutions 260.

---

Price, 60-inch swing, 16-foot bed . . . . . \$  
 " extra, per foot . . . . .

---

72-inch swing, 20-foot bed, turns 10 feet. Swing over carriage 58 inches. Countershaft pulleys 24 x 10 inches. Revolutions 280.

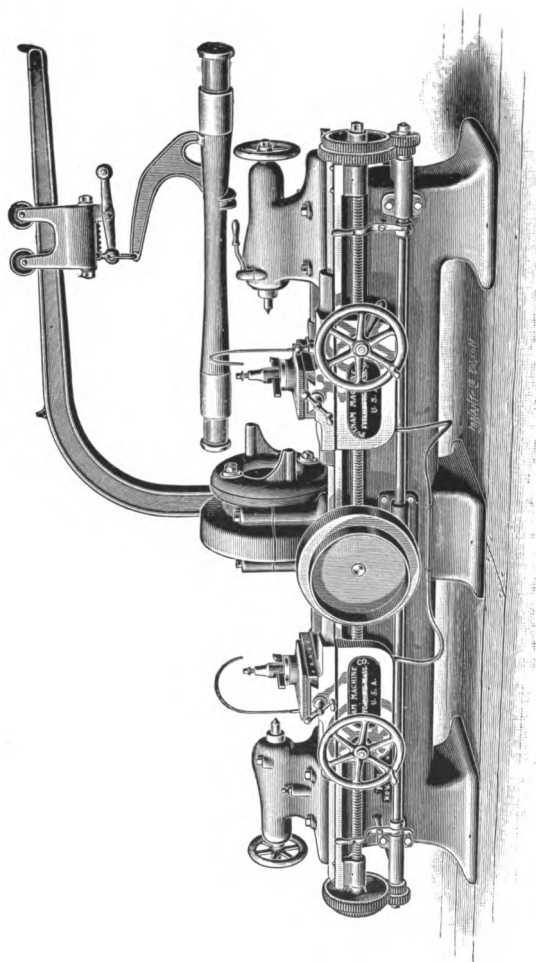
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Price, 72-inch swing, 20-foot bed . . . . . \$  
 " extra, per foot . . . . .

---

Extra heavy 42 and 72-inch lathes are built known as forge lathes.

*Putnam Double Axle Lathe.*





## Double Axle Turning Lathe.

Manufactured by The Putnam Machine Co.

**A** HEAVY, powerful and rapid machine for turning locomotive and car axles, 25 $\frac{3}{4}$ -inch swing, 7 $\frac{1}{2}$  feet between centres. Driving head has a *ten-inch opening* through which the axles are passed, revolved on dead centres and finished complete without reversing. Is operated by worm and gear, driven by cone with 4-inch belt-shifts. End thrust of worm is received on an anti-friction *ball bearing* composed of 100  $\frac{3}{8}$ -inch hardened cast steel balls running in tool steel cases. Is provided with an equalizing or self-centering dog ring. Has double bearings between which the power is applied through the driving gear and worm. This combination gives a steady motion to the axle while under treatment, and produces a smoother cut than is obtained by gearing of other construction.

This lathe will turn 22 or more "Master Car Builders' Standard Axles" in *ten* hours, *roughing out* and *finishing* same with *water polish*.

The lathe has two independent carriages for finishing both ends of the axle at same time. Each carriage is complete with Tool Post, Tool Ring, Water Trough, automatic water pipe with stop cock, hand and power feed for both roughing and finishing cuts. Each carriage is fitted to an extra large "way" on front; also to a *second "way"* nearly *under the tool post*. This serves to arrest vibration when the cutting tool is under heavy cut.

Carriages are operated (both by hand and power) by steel screws. The disengagement of, or change in feed from roughing to finishing is effected by vertical hand levers conveniently located within reach of each carriage.

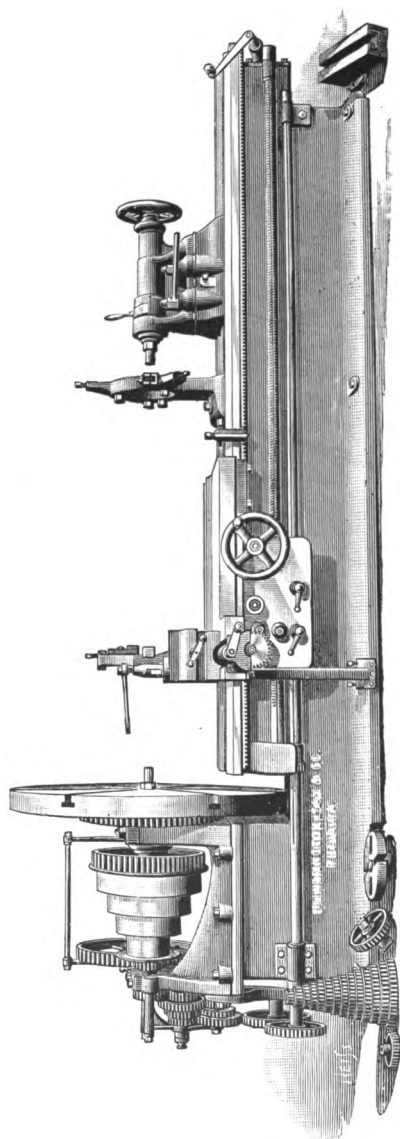
Lathe is provided with large reservoir into which the drip is conveyed after being strained from chips, etc. A rotary pump with relief valve is employed to force liquid in desirable quantities on to the cut.

Countershaft is driven by two sets of tight and loose pulleys 16 inches diameter, 6 inches face, and should make 540 and 640 revolutions per minute. Weight, 10,500 pounds.

Price, . . . . . \$

" cast steel axle dog, extra . . . . .

*Extension Gap Lathe.*



### ***Extension Gap Lathes.***

THESE lathes are designed especially for use in repair or jobbing shops. The operator can make the gap wide or narrow as desired, and the use of the extension top permits of taking a shaft much longer than the lathe. Lathes have geared face plate. The over hang of the carriage is supported by the angle bracket having adjustable shoe on guide at bottom, giving rigid support when turning full swing of the lathe in the gap. These tools are of very high class of workmanship.

### SIZES.

22 and 36-in., 12½ ft. bed. Price, . . . . \$  
 " per foot . . . .

Counter pulleys 16 x 8 in., 90 turns; also for full swing 20 x 4½ in., 68 turns.

28 and 48 in., 12½ ft. bed. Price, . . . . \$  
 " per foot . . . .

Counter pulleys, 22 x 8 in., 70 turns.

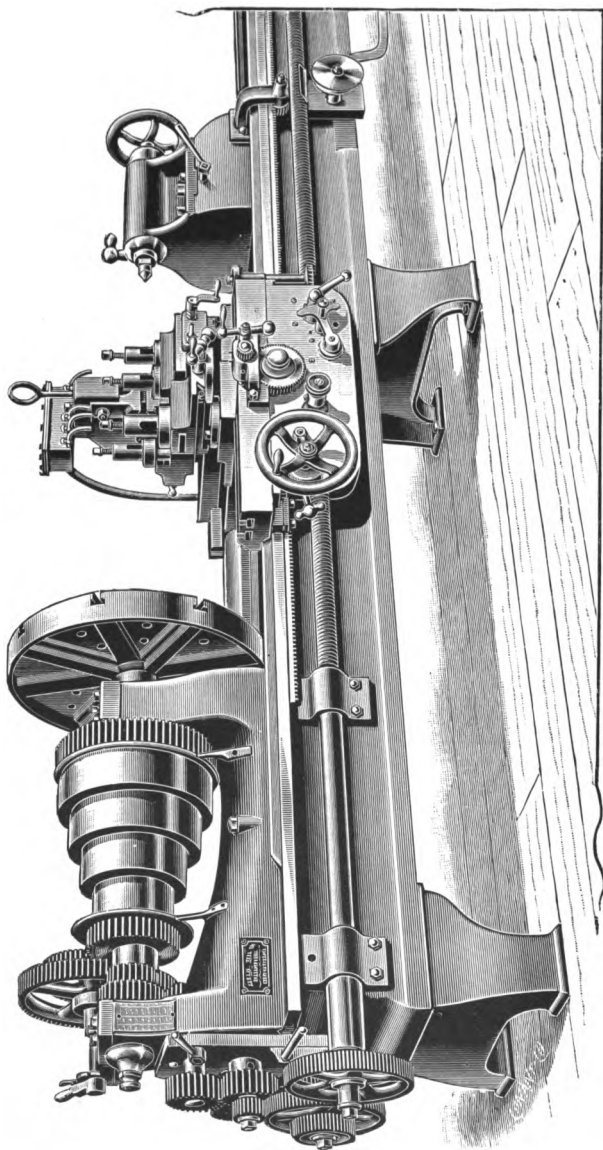
36 and 60 in., 14 ft. bed.    Price. . . . . \$  
                    “ per foot . . .

Counter pulleys 24 x 8 in., 65 turns.

48 and 72 in., 15 ft. bed.	Price.	. . . . .	\$
	"	per foot . . . .	

Counter pulleys 24 x 8 in., 53 turns.

*Gleason Shafting Lathe.*



## *Shafting Lathe.*

*Made by Gleason Tool Co.*

**A**N extremely heavy and powerful tool. Swing 32 inches, head and tail stock add six feet to the turning length of the tool between centres. The special shafting rest has 3 adjustable jaws having 3-inch bearings on the shaft. Three roughing tools precede and one finishing tool follows the jaws. These tools are placed as near the jaws as possible to prevent tremble in the shaft.

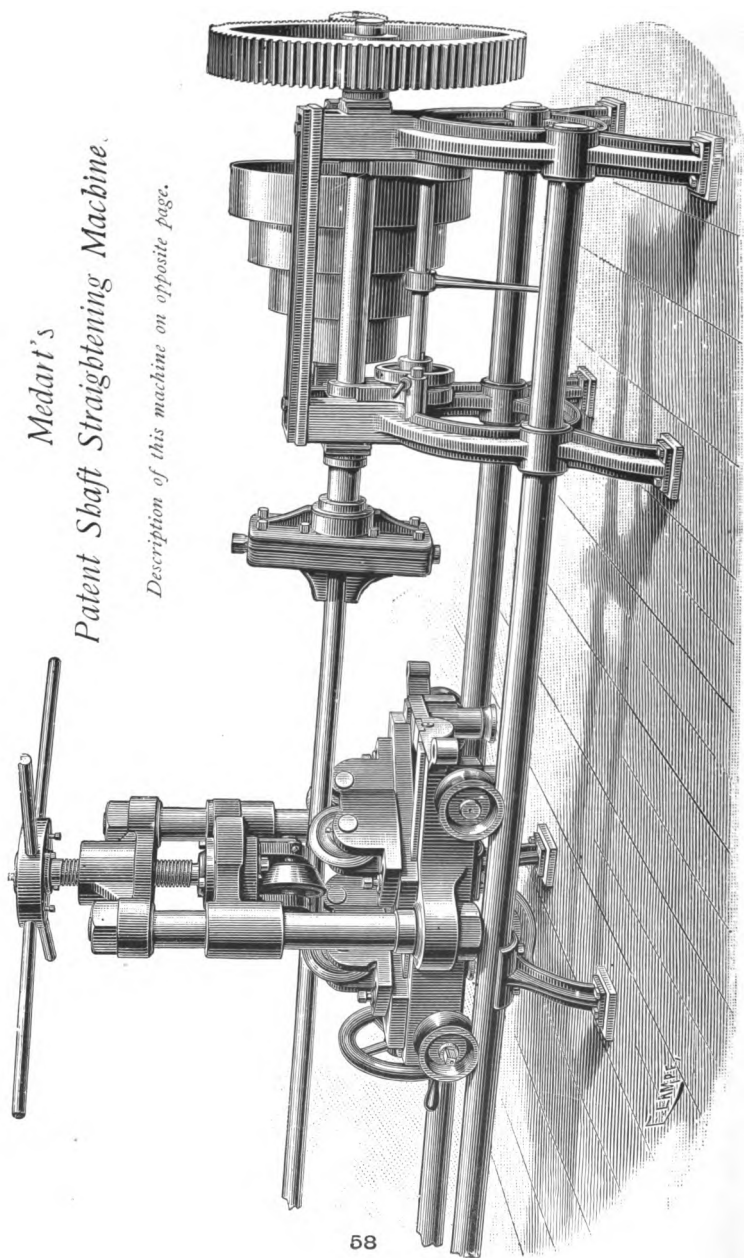
Water tank is attached to the carriage. The rotary pump is driven from the lathe apron and is attached to the rest, so that when rest is removed all special shafting attachments go with it leaving the tool ready for general work as an ordinary lathe.

The lathe is regularly sold with, and price includes, all the attachments of the ordinary lathe, as compound, centre, side turning and follower rests, face plates, etc., screw gears and screw. With these omitted a corresponding reduction will be made.

Lathe will be supplied if desired at additional price with tail driving attachments and the extra shaft under the lathe for transmitting the power will be large and stiff. With this the lathe must be eight feet longer than it will turn instead of six as above.

---

Price, 32-inch shafting lathe, 24-foot bed, to	
turn 18 feet . . . . .	\$
“     extra, per foot . . . . .	



*Medart's  
Patent Shaft Straightening Machine.*

*Description of this machine on opposite page.*

## ***Medart's Shaft Straightener.***

---

*invented by Philip Medart.*

---

CUT on opposite page represents a new invention for cold straightening round iron and gas pipe. Its value can be judged by the fact that with its aid the cost of finishing shafting is reduced fully fifty per cent as compared with the old method, which has been fully demonstrated by use in different shops.

This machine straightens a 24-foot bar of 3 inches diameter, round iron, in 3 minutes and 20 seconds, taking out all the crooks and kinks, and leaving the bar in the proper condition for the lathe.

It also removes the skin or scale of the iron, and straightens much more accurately than is possible by the old process, greatly facilitating the turning of the iron, since the tool cuts the same thickness of chip from end to end, in consequence of which the lathe can be run at a much higher speed than when turning iron straightened in the old way.

The bar, after being turned, is again run through the rolls for the purpose of removing the tool marks, and giving it a polished finish with the same operation. This is accomplished even though the tool finish is comparatively rough.

This machine takes in bars  $1\frac{1}{4}$  to  $4\frac{1}{2}$  inches diameter and 25 feet long, and can be operated by one unskilled man, the manner of operating being as follows:—

The press being placed at a distance from the chuck corresponding to the length of the bar to be operated upon, and the bar being placed in position, one end on the rolls, the other held fast in the chuck, the chuck is set in motion, turning to the right. The top rolls are then brought to bear by the screw shown, when the press will travel automatically toward the chuck. When it has reached the chuck, the motion is reversed, and the press will travel back to the starting point, the bar then being ready for the lathe.

We are prepared to furnish these machines on short notice.

A smaller size machine that will take shafts up to  $2\frac{1}{2}$ -inch is also being built, and can be furnished when ordered.

---

*Prices on application.*

*The Rivett Lathe and Attachments.*





***Rivett Bench Lathe.***

**A Machine of the very highest class, intended for all sorts of nice fine work.**

**T**HE cut opposite represents this lathe with revolvable tail stock, with the slide rest fixed to it, and the milling and gear cutting attachment in place.

Lathe swings 8 inches, length 36 inches. Head stock, tail stock, spindles and bearings of best tool steel hardened. Draw bar through hole in the spindle for holding split clutches. Flange of largest cone indexed.

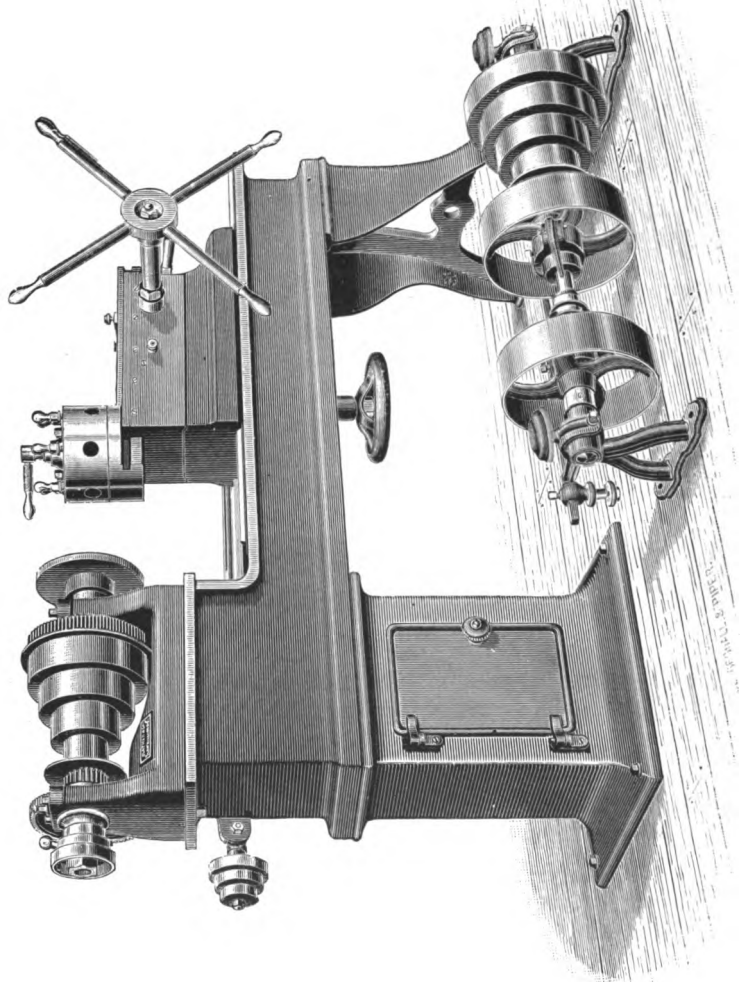
Besides fixtures illustrated, lathe can have grinding attachment, turret attachment, automatic wire feed, power feed to slide rest fitted for screw, cutting-off and knurling attachments.

A special catalogue fully illustrates this machine, and should be studied to understand its merits.

**PRICES.**

<b>Lathe No. 4, length of bed 36 in., including T-rest,</b>	
<b>Face-plate, 2 centres and back rest . . . . .</b>	<b>\$</b>
<b>Screw cutting attachment . . . . .</b>	
<b>Patent slide rest . . . . .</b>	
<b>Milling attachment, to go on slide rest . . . . .</b>	
<b>Face-plate, extra, according to size . . . . .</b>	
<b>Chucks, split, hardened steel, accurately ground, ea.</b>	
<b>Cutting-off attachment, to go on slide rest . . . . .</b>	
<b>Grinder, to go on slide rest . . . . .</b>	
<b>Countershaft, plain, 2 speeds . . . . .</b>	
<b>" 2 speeds and reverse motion . . . . .</b>	
<b>" with improved leader . . . . .</b>	

*Flatber 26 Inch Swing Turret Head Chucking Lathe.*



Send for special circular, which shows the back view of this machine, with the power feed on the turret.

*Price and description of this machine on opposite page.*

## ***Turret Head Chucking Lathe.***

*Made by Flather & Co.*

---

**C**UT on opposite page illustrates our Turret Head Chucking Lathe and Screw Machine.

It swings 26 inches, and the bed is  $5\frac{1}{2}$  feet long. The head-stock is back geared. Cone has four speeds for  $2\frac{1}{2}$  belt; hole in head spindle,  $1\frac{1}{4}$  inches in diameter. Turret is self-revolving. The turret slide is 24 inches long, and has a movement of 10 inches. The turret head is  $8\frac{3}{4}$  inches diameter, and has six holes  $1\frac{1}{4}$  inches in diameter. There is also a drill guide for long drills, which can be instantly thrown back out of the way (this is not shown in cut).

The leg under head end of bed is made in the form of a closet, for holding tools and cutters.

Speed of countershaft, 120 revolutions per minute. Tight and loose pulleys, 12 inches in diameter,  $3\frac{1}{2}$  inches face. Weight, 1,800 pounds.

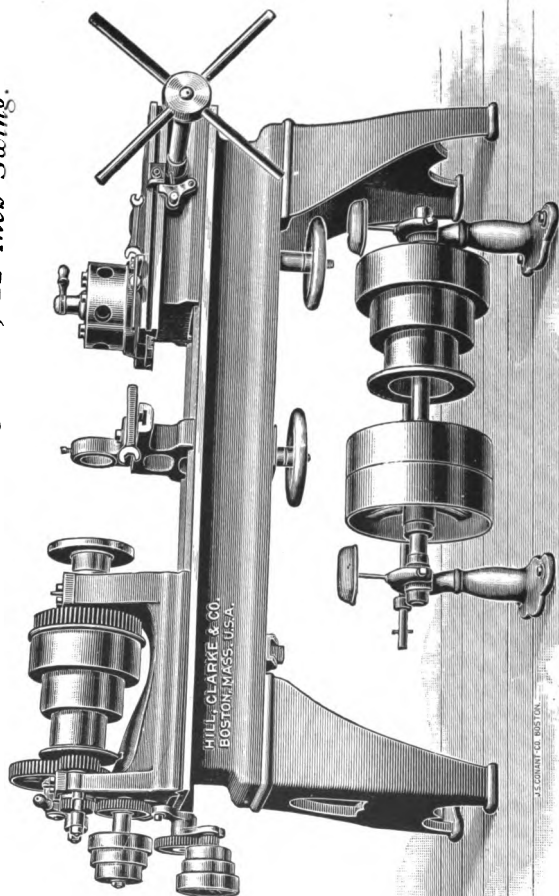
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**Price, with back gears and power feed . . . . \$**

---

*Patterns are being made for a larger size machine.*

*Eddy Turret Head Chucking Lathe, 22 Inch Swing.*



### *Turret Head Chucking Lathe.*

---

THE cut on opposite page illustrates the Eddy Turret Head Chucking Lathe, without cross motion.

The spindle is made from forged steel, running in composition boxes, the journals being of ample diameter and length for the work required.

The turret is furnished with a stop motion which can be set to stop automatically at any given point.

It is revolved by drawing the stop lever shown on the front side of slide and turning by hand, which is more convenient than an automatic revolving turret as it is not necessary to pull the slide back as far when on short work.

The turret base is securely clamped to the bed by the lever shown on the front side of the base piece and is easily moved to any position on the bed by a pinion working in the rack, the same being operated from the front side of the bed.

Each machine is provided with the Combination Chucking Rest shown in the cut, of novel and peculiar construction. It is bored to receive bushings to support long cutter bars.

With this machine one man can easily chuck double the number of holes possible to be done on the old-fashioned chucking lathes.

The spindle is furnished with a small face plate, and we can fit to the same any make or style of chuck which may be ordered.

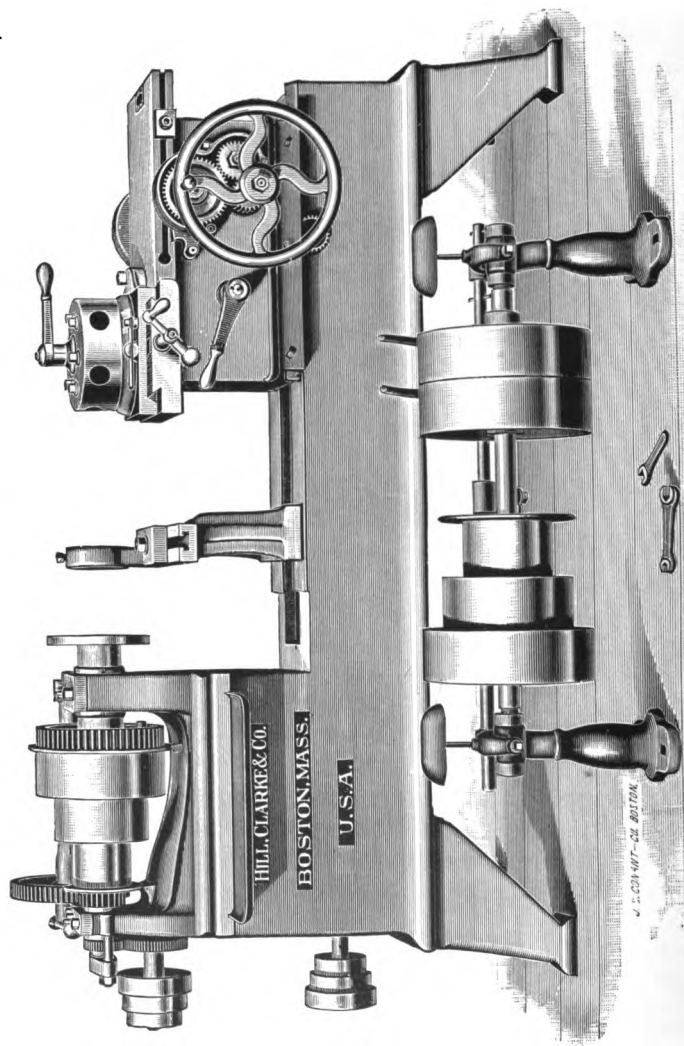
The machine is complete with countershaft, chucking rest, face plate and wrenches.

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*For list of sizes and prices see page 67*

*Eddy Turret Head Chucking Lathe, 40 Inch Swing.*

WITH FACING ATTACHMENT.



*Turret Head Chucking Lathe.*

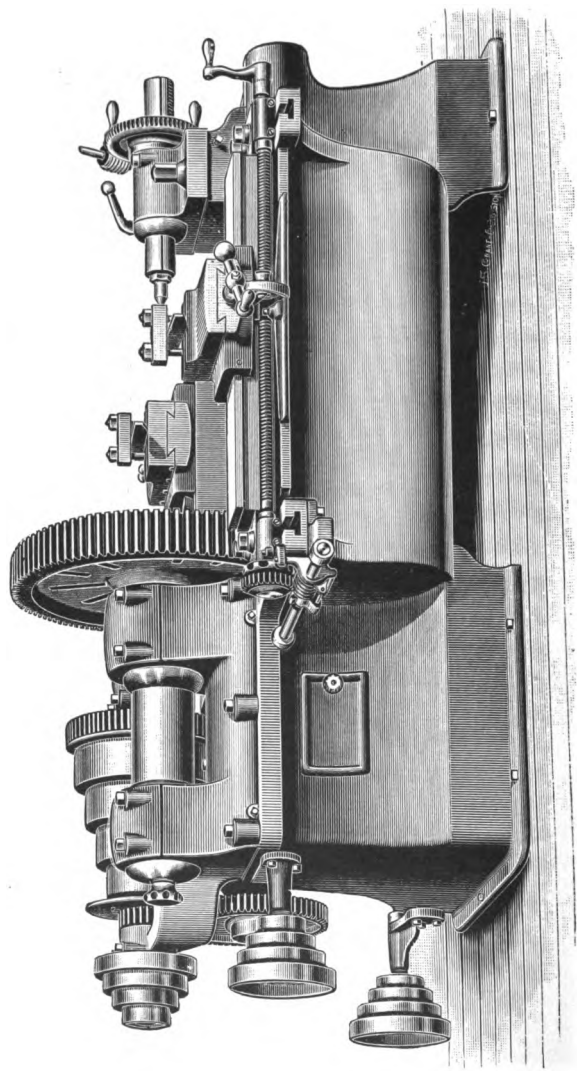
## LIST OF SIZES :

Swing with facing attachment, . . . . .	26 in.	40 in.	50 in.
Swing without facing attachment, . . . . .	22 "	36 "	50 "
Length of bed, . . . . .	6 ft. 6 in.	6 ft. 4 in.	8 ft.
Distance between centers, . . . . .	28 in.	28 in.	36 in.
Length of turret slide, . . . . .	24 "	24 "	36 "
Length of power feed, . . . . .	18 "	18 "	20 "
Will face up with cross feed, . . . . .	16 "	16 "	32 "
Diameter hole in spindle, . . . . .	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "	1 $\frac{3}{8}$ "
Number of steps to cone, . . . . .	3	3	4
Width of belt, . . . . .	4 in.	4 in.	4 in.
Diameter of turret, . . . . .	10 "	10 "	14 "
Number of holes in turret, . . . . .	6	6	6
Diameter of holes in turret, . . . . .	1 $\frac{3}{4}$ in.	1 $\frac{3}{4}$ in.	2 in.
Weight plain turret, . . . . .	2300 lbs	3000 lbs.	5000 lbs.
Weight with cross feed, . . . . .	2400 "	3200 "	5300 "
T. & L. pulleys, diam., . . . . .	15 in.	15 in.	18 in.
T. & L. pulleys, face, . . . . .	4 "	4 "	4 "
Speed of countershaft, . . . . .	125	125	100
Price of plain turret machine, . . . . .			
Price of hand facing attachment, . . . . .			
Price of power facing attachment, . . . . .			

Holes in spindles and traverse of slides can be varied to suit.

*Stevens' Pulley Turning Lathe, 50 Inch Swing.*

WITH TWO TOOLS AND BORING ATTACHMENT.





### *Stevens' Pulley Turning Lathes.*

**T**HE cut of the 50-inch opposite will illustrate these tools, which are fitted for turning and boring at one operation.

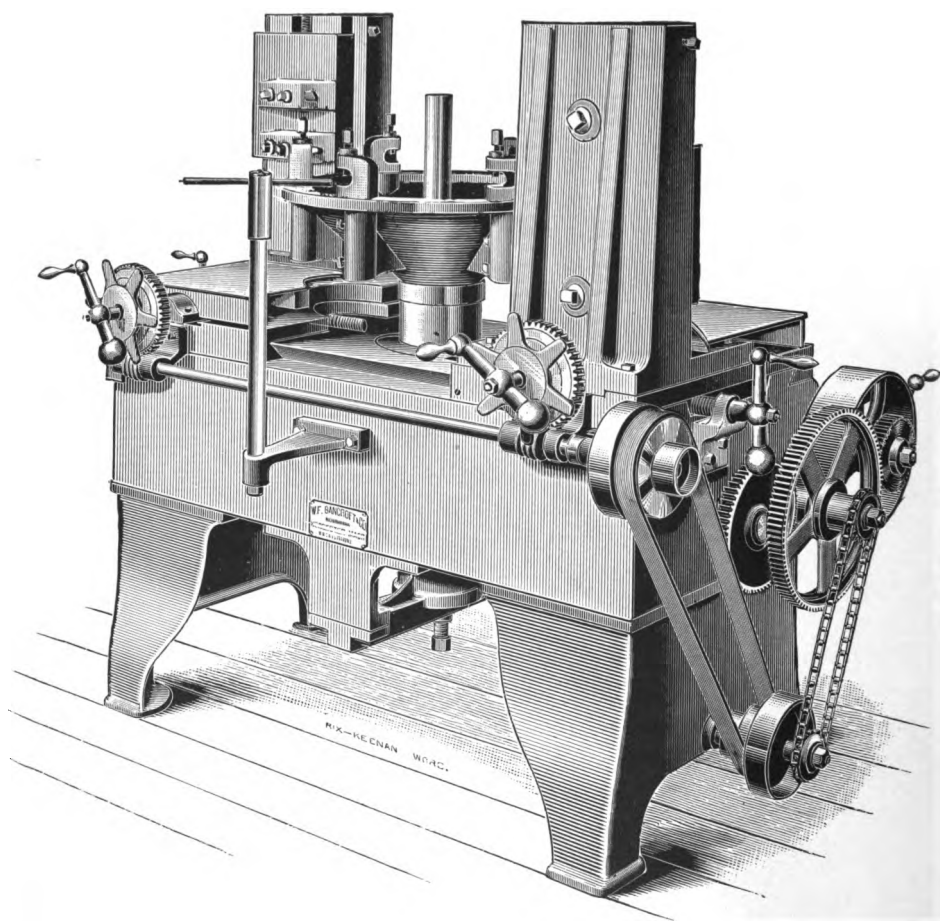
As shown they carry two tool posts, one in front and one in rear. Will turn pulleys flat-faced or to any desired curve. The boring is with power feed.

Price, all complete, with countershaft,—

60-inch two tools and boring attachment . . .	\$
50 " one tool . . . . .	
50 " " " and boring attachment . . .	
50 " two tools " " " . . .	
36 " one tool . . . . .	
36 " " " and boring attachment . . .	
36 " two tools " " " . . .	
26 " one tool . . . . .	
26 " " " and boring attachment . . .	
26 " two tools " " " . . .	

# *Wood's Pulley Turning Machine.*

(PATENTS PENDING.)



## *Wood's Pulley Turning Machine.*

*Built by W. F. Bancroft & Co.*

**A** MACHINE for turning pulleys, requires to be made of sufficient weight to absorb all the vibration and strain when doing its work, geared strong enough to carry all the cut the tools and the rim of the pulley will stand. The pulley to be turned, after being bored, is placed upon an arbor fitted in the spindle in the centre of the bed, firmly held by the arms near the rim in horizontal position in an improved chuck, easily and quickly adjusted. A bevel gear 20 inches diameter on spindle 9 inches diameter, connected with a train of gears on end of machine carries all required power.

To give the changes of speed required for different sized pulleys, the pinion gear on the pulley shaft is changed in a moment to meet any required speed. Upon each side of the spindle, on the bed is fitted a shoe carrying a tool post, containing a bar upon which is fitted a tool stock, made to feed up or down by a screw connected by a worm gear shaft, driven by friction. A shaft with a worm gives motion to the gear and is connected with cone pulleys giving changes of feed. The bar in the post carrying the tool stock swings adjustably on the centre of worm gear shaft and is held by adjustable screws for either straight or crowning face. To meet the different sized pulleys from 12 to 30 inches diameter, and 12 inches face, the shoes carrying the tool post are by a screw made to move to or from the centre to any required distance. In moving the tool posts right or left the taper arrangement is never disarranged, but always ready for use.

In turning a pulley, the tool upon one side of the pulley begins its cut in the centre of the pulley and feeds up; the tool on the opposite side is placed in the track of the first tool and feeds down.

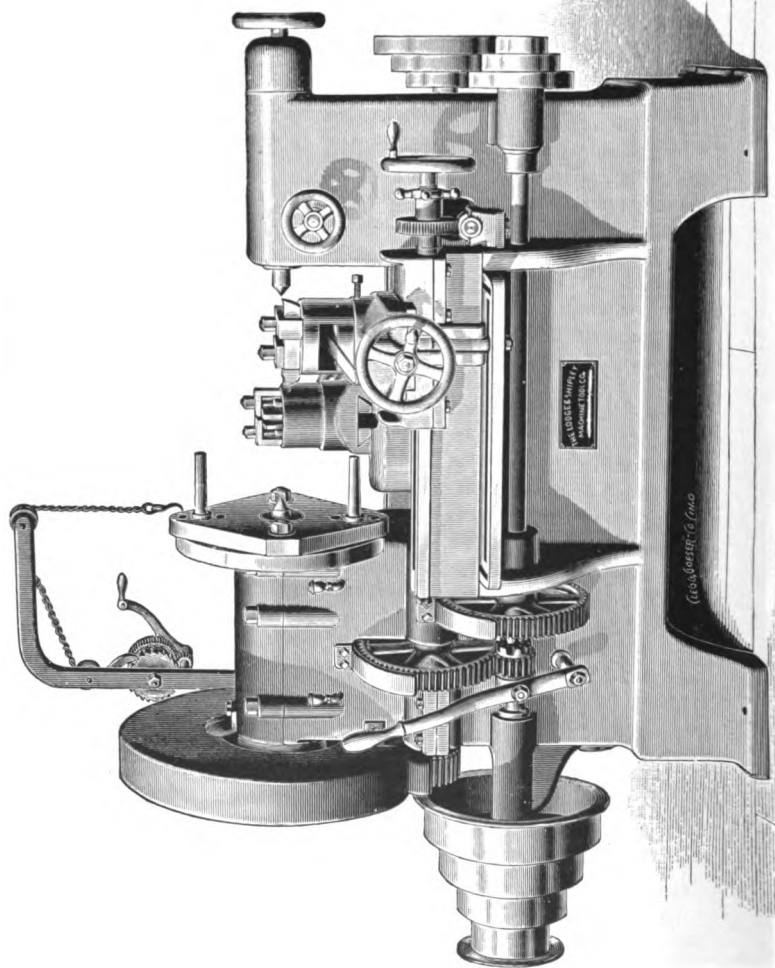
All the points in a first-class pulley machine are centered in this, and this machine is offered in competition with any good pulley turning machine in the trade.

The amount of work this machine will do, like all machines of its kind, depends upon the perfection of the pattern used, quality of iron, and the ability of the operator.

Three sizes of these machines are at present made, 20, 30 and 36 inch.

Prices on application.

*Lodge-Shiple 30 Inch Pulley Lathe.*



***Pulley, Motor Gear and Special Turret Lathes,***  
**FOR HEAVY WORK.**

*Made by Lodge-Shipley Machine Tool Co.*

---

**T**HE Pulley Lathe illustrated opposite is an extremely powerful machine, adapted to pulleys up to 30-inch diameter, 20-inch face. The frame, head and tail stocks are all cast in one piece. The driving belt is  $3\frac{1}{2}$  inches wide and with back gears in, ratio of driving shaft to spindle of 30 to 1. Spindle 6 in. diameter, with  $3\frac{1}{2}$ -inch hole through it. The nose of spindle  $9\frac{1}{4}$  inches diameter, threaded. Saddles are driven by screws with bronze worm wheel, steel worm and friction. Front tool block is a two hole turret. Weight, 4,500 pounds.

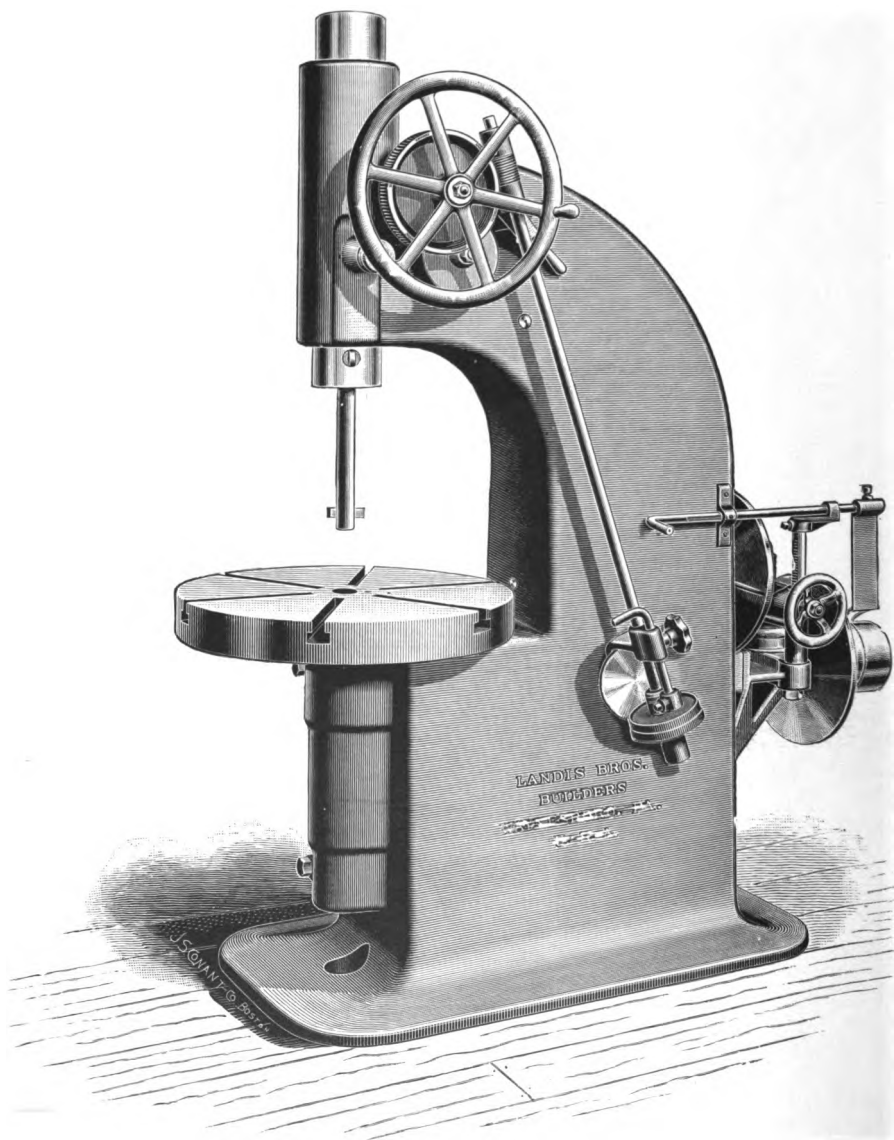
Two other sizes are also made, swinging respectively 20 and 60 inches.

This machine is also made with a sliding tail stock, with travel of 16 inches by power especially designed for turning and boring motor gears.

It is also fitted with turret for heavy engine work and thus becomes a turret lathe of extreme power, designed for performing on cast iron many of the operations performed by the screw machine on wrought iron.

Detailed circulars of these machines, which are new tools of great interest, on application.

*Landis Bros. Boring Mill.*



### ***The Landis Bros. New Boring Machine.***

*27 Inch Swing.*

**T**HIS tool is very strong and rigid and particularly adapted for chucking pulleys.

It is driven by a friction giving any desired speed from 13 to 130 revolutions per minute *without any slip*. The feed is also a variable friction from 0 to  $\frac{1}{8}$  inch to each revolution. There is an automatic stop to the feed.

Boring tools are held in same by automatic clamp and can be changed without stopping the machine as quickly as a turret could be revolved.

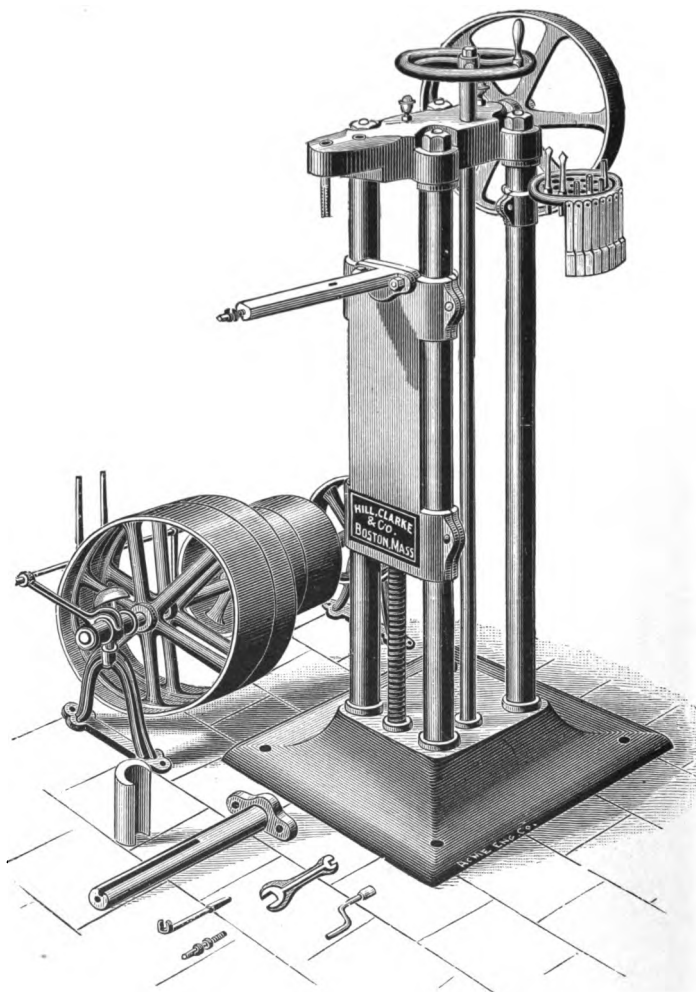
A hole through table allows chips to fall down from the tool in chucking.

---

**Price, . . . . . \$**

## *Pulley Drilling and Tapping Machine.*

MANUFACTURED FOR HILL, CLARKE & CO.



This machine will drill and tap pulleys from 12 to 60 inches in diameter,  
and up to 20 inches face.

*Price and description of this machine on opposite page.*



## *Pulley Drilling and Tapping Machine.*

---

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**T**HIS special Drilling and Tapping Machine will drill and tap pulleys from 12 to 60 inches diameter, and any width of face up to 20 inches. With it a boy can drill and set-screw pulleys, gears, sprocket-wheels, slip-collars, flanges, and any thing that is fastened to a shaft with set screws, and do it with absolute certainty that the screws will bear square on the shaft. It only requires one motion of shifter lever to change from drilling to tapping, and the tap has quick return in backing out. The mandrels for holding pulleys, etc., work on the expansion principle, and the work can be secured on them as quickly as tool can be clamped in tool post of lathe. A complete set of mandrels to take from  $1\frac{7}{8}$  inches up to 4 inches is furnished with each machine, and also a full set of drills, taps, and liners.

The countershaft is arranged with tight and loose pulleys, and runs with two belts (open and crossed), so as to give a right-hand motion to the socket for tapping, and a left-hand motion for drilling and for backing out the taps. The front part of the head carrying the drill and tap socket is constructed so that it will go between the rim and hub of a *twelve-inch pulley* and set-screw it without drilling through the rim; below that size the pulleys are drilled and tapped through the rim. The relations of the drill socket and the mandrel are such that the drills and taps point exactly to the centre of the bore in the pulley, and lack of skill in the operator should not cause them to deviate from their proper course.

All working parts of the machine and the mandrels are made of steel, and all parts subjected to bruising wear are case-hardened.

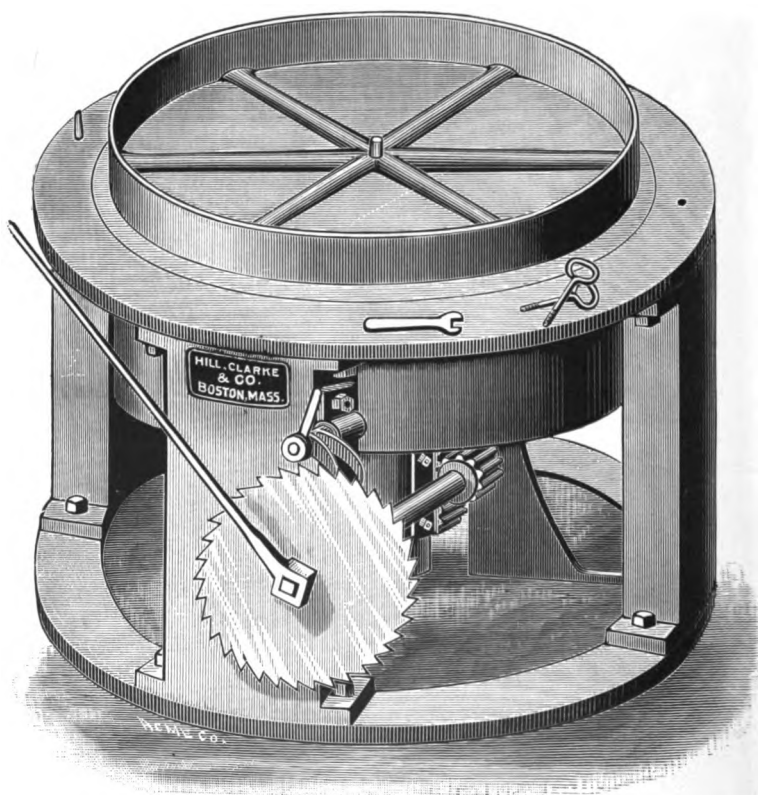
**Speeds of countershaft, 200 and 85 revolutions per minute. Tight and loose pulleys, 12 and 18 inches diameter,  $3\frac{1}{2}$  inches face.**

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**Price, all complete . . . . . \$**

## *Pulley Moulding Machine.*

MANUFACTURED FOR HILL, CLARKE & CO.



This cut represents the No. 3 machine, which will mould pulleys from  
25 to 36 inches in diameter.

*Description of this machine, with list of sizes and prices, on opposite page.*

## *Pulley Moulding Machines.*

**A** MAN can accomplish, by the use of these machines, from four to eight times as much work as he can by the old way of moulding pulleys, and the result is a pulley casting absolutely true.

These machines are furnished with patterns varying in diameter by inches, or two inches, as desired.

**No. 1** machine moulds pulleys from 6 inches to 15 inches in diameter.

**No. 2**    "        "        "        "    16    "        "        24    "        "        "

**No. 3**    "        "        "        "    25    "        "        36    "        "        "

**No. 4**    "        "        "        "    37    "        "        48    "        "        "

### LIST OF PRICES.

NO. PATTERNS.		CAPACITY.				PRICE.	
<b>1</b>	<b>10</b>	<b>6 inches to 15 inches, inclusive, by inches, \$</b>					
<b>1</b>	<b>5</b>	<b>6</b>	"	"	<b>14</b>	"	" <b>2</b> "
<b>2</b>	<b>9</b>	<b>16</b>	"	"	<b>24</b>	"	"    —    "
<b>2</b>	<b>5</b>	<b>16</b>	"	"	<b>24</b>	"	" <b>2</b> "
<b>2</b>	<b>none</b>	<b>16</b>	"	"	<b>24</b>	"	"    —    "
<b>3</b>	<b>12</b>	<b>25</b>	"	"	<b>36</b>	"	"    —    "
<b>3</b>	<b>6</b>	<b>26</b>	"	"	<b>36</b>	"	" <b>2</b> "
<b>3</b>	<b>none</b>	<b>26</b>	"	"	<b>36</b>	"	"    —    "
<b>4</b>	<b>6</b>	<b>38</b>	"	"	<b>48</b>	"	" <b>2</b> "

Above prices include three sets of arm patterns—light, medium, and heavy—for each diameter. Maximum width of faces run from 11 inches on smallest to 24 inches on largest. Minimum width of face is thickness of arms.

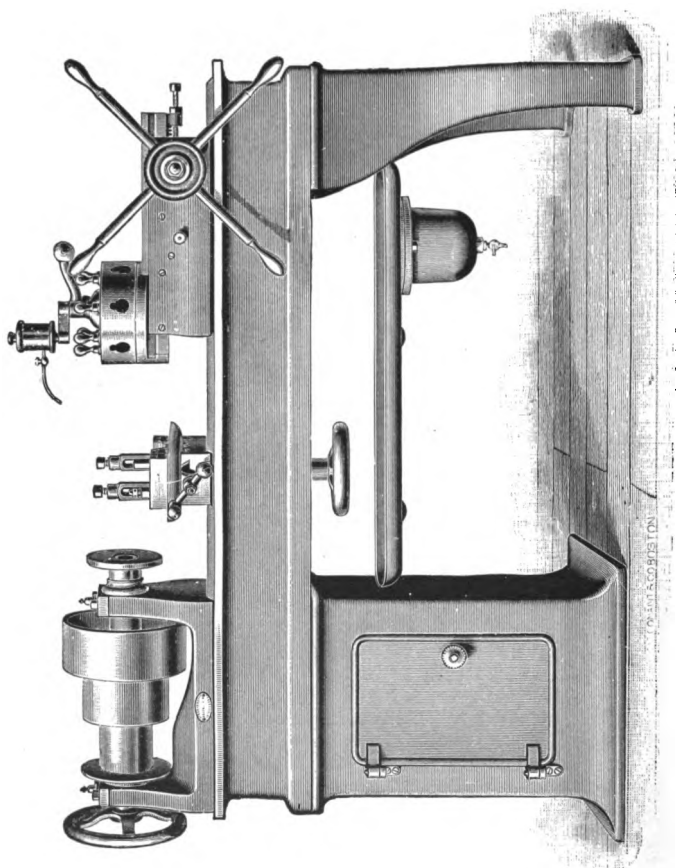
**No. 3** machine: for each set of arm patterns not wanted, deduct 10 per cent, there being three sets included in above prices. **No. 3** machine without arm patterns would reduce the price 30 per cent.

**No. 1** machine has 3 sample flasks,—12 inches, 14 inches, and 18 inches diameter; depth, 6 inches.

**No. 2** machine has 2 sample flasks,—24 inches and 28 inches diameter; depth, 6 inches.

**No. 3** machine has 3 sample flasks,—32 inches, 36 inches, and 40 inches diameter; depth, 6 inches.

## *Flatber's Improved Screw Machine.*



This cut represents the machine with a 3-step cone for 4-inch belt. A 4-step cone for 3½-inch belt can be furnished if desired, and, if wanted with back gears, has a 4-step cone for 2½-inch belt.

*Price and description of this machine on opposite page.*

## *Improved Screw Machine.*

*Made by Flather & Co.*

---

**T**HIS machine is very heavy and powerful for its size, and is capable of making finished screws and studs up to 1 inch diameter.

As shown in the cut on the opposite page, this machine has a 3-step cone for 4-inch belt.

A 4-step cone for 3½-inch belt can be furnished if desired; and, if wanted with back gears, has a 4-step cone for 2½-inch belt.

The turret head revolves automatically when the slide is run back, and it can be furnished with power feed if desired.

Swing over bed, 16 inches. Length of bed, 5½ feet. Hole through head spindle, 1¼ inches diameter. Diameter of turret, 8¾ inches. Six holes in turret, 1¼ inches diameter. Length of turret slide, 24 inches. Movement of turret slide, 10 inches. Speed of countershaft, 120 revolutions per minute. Friction pulleys, 12 inches diameter, 3½ inches face.

When furnished complete, has back gears, cut-off rest, countershaft, and necessary wrenches.

**Weight, 1,600 pounds.**

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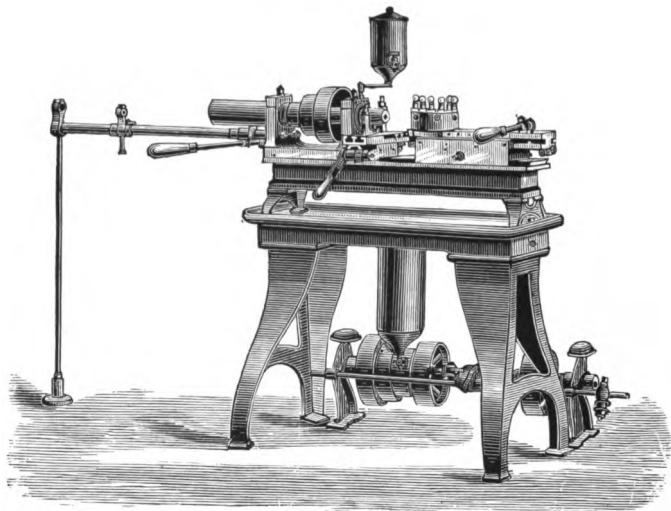
Price, complete . . . . .	\$
“ “ with power feed . . . . .	

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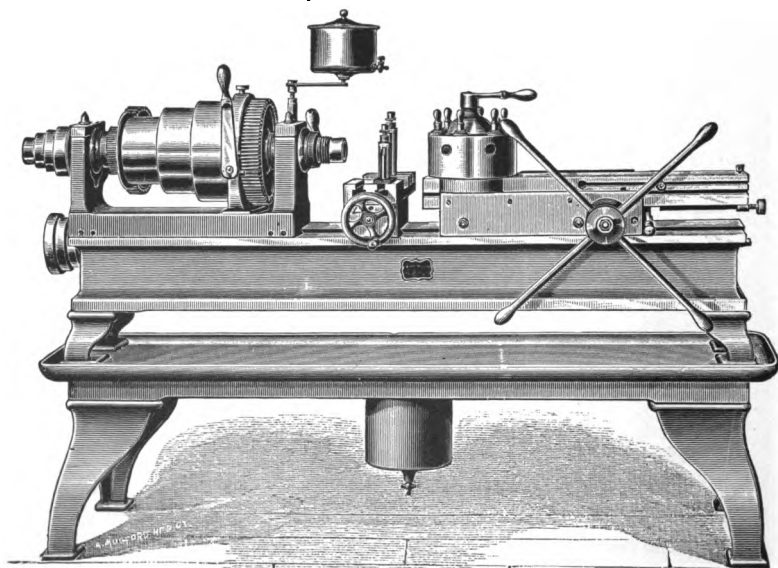
Deduct from list price for cut-off rest, if not wanted, \$      deduct from list price for back gears, if not wanted, \$      When furnished without back gears or cut-off rest, this machine makes a first-rate turret lathe for brass work.

*No. 1 Screw Machine.*

WITH PARKHURST WIRE FEED.



*No. 4 Screw Machine.*



### ***Pratt & Whitney Turret Machines.***

---

THE power and scope of this class of machines has of late been greatly increased, and they are coming to be recognized as necessary tools for general machine-shop work, much of which they will do from three to six times as fast as a lathe. These tools are divided into three classes: *screw machines*, *turret chucking lathes* and *facing and chucking machines*.

#### ***Screw Machines.***

THE turrets are self-rotating and self-fastening. With each machine are wrenches, oil tank and dripper, Pratt's patent reversing countershaft, cut-off rest and tool posts. Compensating arrangement for wear are provided. Each machine has one leg arranged to swivel, with adjusting set screws, to accommodate itself to unevenness in the floor.

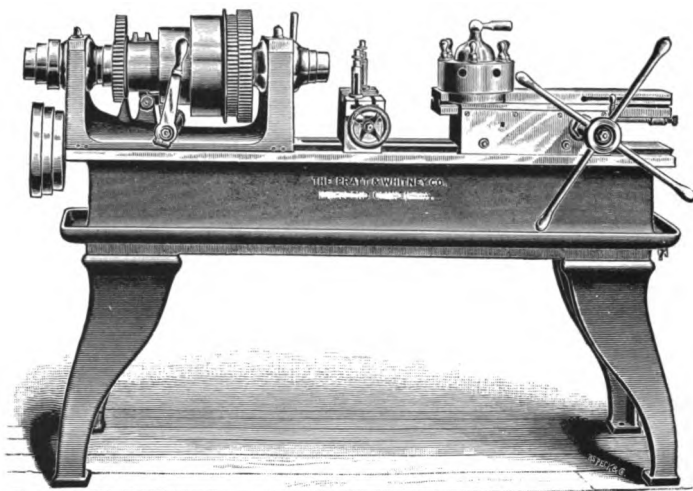
Turrets can be made with holes straight through, and the turret tools arranged for the passage of work, so that it is possible to take cuts of any length that the travel of the turret may be arranged for. This, combined with the new "box tool rest" described below, gives these tools a power and a capacity heretofore unknown.

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*For description of attachments see page 87. For details and prices see pages 89-91.*

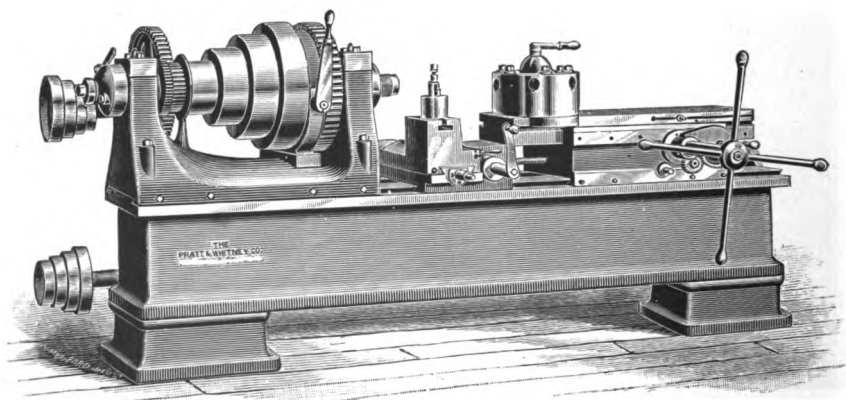
## *16 Inch Turret Chucking Lathe.*

WITH DOUBLE BACK GEARS.



## *30 Inch Turret Chucking Lathe.*

MADE ONLY TO ORDER.





### ***Turret Head Chucking Lathes.***

*Made by the Pratt & Whitney Co.*

---

**T**HESE tools are used for the same purpose as the ordinary chucking lathe, also, when fitted with the necessary tools for many varieties of machine work in cast or wrought iron where work has angular outline and circular cross section. They have the same construction above the bed as the screw machines, but lack oiling apparatus. They can have the plain or friction gears, power feed to turret and back mechanism, etc., described hereafter. They are made with either solid or hollow spindle as the work may require.

Description of attachments, and details and prices pages 87-89, apply as well to these as to screw machines.

The list and prices of tools, page 89, also applies to chucking lathes as well as screw machines.

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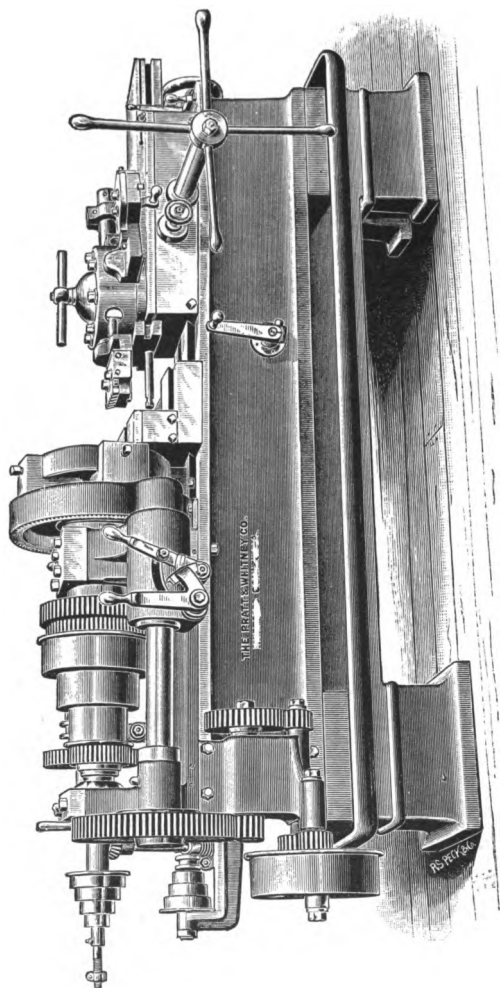
### ***Facing and Chucking Machines.***

**Made only to order.**

---

**T**HESE are tools of very great power, made from 16 to 28 inch swing. They have in addition to usual driving gear a special train geared into the face plate. They are designed for chucking and squaring up hubs, the sides and inner rims of ribbed gear blanks and other very heavy work. See cut of 19-inch on next page.

*19 Inch Facing and Chucking Machine.*



### *Pratt & Whitney Turret Machines.*

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**T**O the screw and chucking machines are added a great variety of attachments.

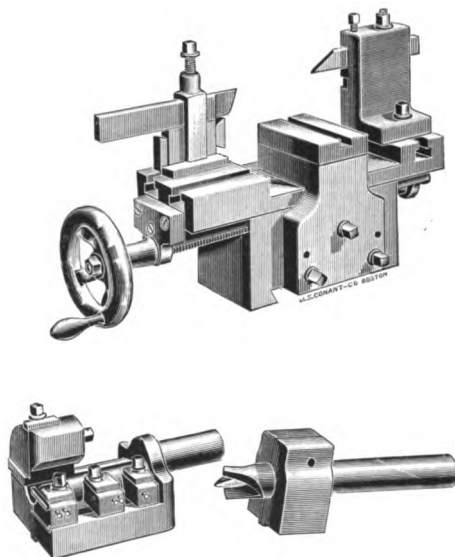
**BACK GEARS.**—These are either plain or with friction clutch operated by lever in front of the head stock. These gears are made double giving two speeds at will and the lever will throw in either gear or both out without stopping the machine. These friction back gears are made with either one of three sized holes through the spindle as desired (see details page 89.) They are applied only to No. 3, 4 and 5 screw machines, and the corresponding sizes of chucking machines.

**PARKHURST WIRE FEED ATTACHMENT.**—This is operated by the movement of a hand lever. It feeds the wire forward to a length regulated by an adjustable gauge stop held in the turret, and the same movement that brings the wire forward closes the jaws of the chuck, holding the wire firmly. The reverse movements are performed instantaneously without stopping the machine. It may be used on all the machines, and is adapted to rods up to 2 inches diameter. One collet for holding rods in the chuck is furnished with the wire feeder of each machine. The engraving of No. 1 screw machine shows this attachment.

**DRAW BACK COLLET MECHANISM.**—This takes the place of the Parkhurst wire feed and should be used where work must be accurately in line, as for forming exterior and interior cylindrical surfaces truly concentric.

**CHASING ARRANGEMENTS, POWER FEED TO TURRET, SCREW FEED AND POWER CROSS FEED TO CARRIAGE, OILING APPARATUS** by pump and fixtures may also be added, also the **Box Tool Rest**, described on next page.

## *Box Tool Rest.*



This very simple attachment is a late invention adding enormously to the efficiency and accuracy of the screw machine. It consists of a block attached to the cut-off slide grooved longitudinally. Into this groove slide tongues fitted accurately on the bottom of the box and other turret tools, holding the same rigidly in place close to the work, thus enabling them to take vastly heavier cuts without tremble and without yielding. Illustrations above will make clear the nature of this great improvement.

*Details and Prices of Screw Machines and Chucking Lathes with Attachments.*

NUMBER	0	1	2	2½	3	4	5
Swing	....	....	....	14	16	18	21
Length will mill	2	2½	3½	4¾	6	9½	14
Hole through spindle with standard head	5/8	¾	1 1/8	1 1/8	1¾	....	....
With friction gears, No. 1	....	....	....	....	1¾	2½	2 7/8
" " No. 2	....	....	....	....	2 7/8	2 5/8	3 1/8
" " No. 3	....	....	....	....	2 1/8	3 1/8	3 1/8
Largest diam. wire feed will take	1 1/8	1 1/8	5/8	1	1 1/8	1 5/8	....
Largest diam. draw back collet mechanism will take with No. 1 head	....	....	....	1 1/8	1 1/4	1 5/8	....
" " No. 2 head	....	....	....	1 1/8	2	2 1/8	....
" " No. 3 head	....	....	....	....	2 5/8	2 5/8	....
Diameter turret	3 7/8	4 1/4	6 1/4	7 3/4	8 3/4	11 3/4	12 1/2
Holes in turret (which can be varied)	1 1/8	1 1/8	1 1/8	1	1 1/4	1 3/4	2
Weight	350	475	820	1450	1900	3200	5000
Pulleys, counter	8 x 2 3/4	9 x 3 1/4	10 x 3 1/4	12 x 4	12 x 4	16 x 4 3/4	16 x 4 3/4
Revolutions of, made with speeds if desired	360	310	220	150	150	120	110
Price	\$	....	....	....	....	....	....
With back gear, plain	....	....	....	....	....	....	....
With friction clutch, No. 1 head	....	....	....	....	....	....	....
" " No. 2 head	....	....	....	....	....	....	....
" " No. 3 head	....	....	....	....	....	....	....
Wire feed mechanism	....	....	....	....	....	....	....
Collets for wire feed mechanism	....	....	....	....	....	....	....
Draw back collet mechanism, No. 1 head	....	....	....	....	....	....	....
" " " No. 2 head	....	....	....	....	....	....	....
" " " No. 3 head	....	....	....	....	....	....	....
Collets each for No. 1	....	....	....	....	....	....	....
" " No. 2	....	....	....	....	....	....	....
" " No. 3	....	....	....	....	....	....	....
Chasing apparatus with one leader and nut	....	....	....	....	....	....	....
Carriage for turning and screw cutting	....	....	....	....	....	....	....
Box tool rest	....	....	....	....	....	....	....

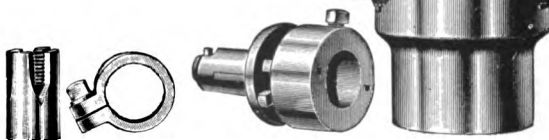
Chucking lathes of larger size to 30-inch are made to order.



Hollow Mill.

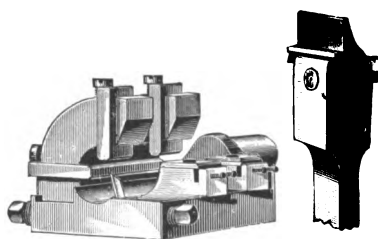


Spring Screw Threading Die.



Die with Reversible Holder and Clamp Collar for Controlling Exact Diameter.

2 Jaw Chuck.



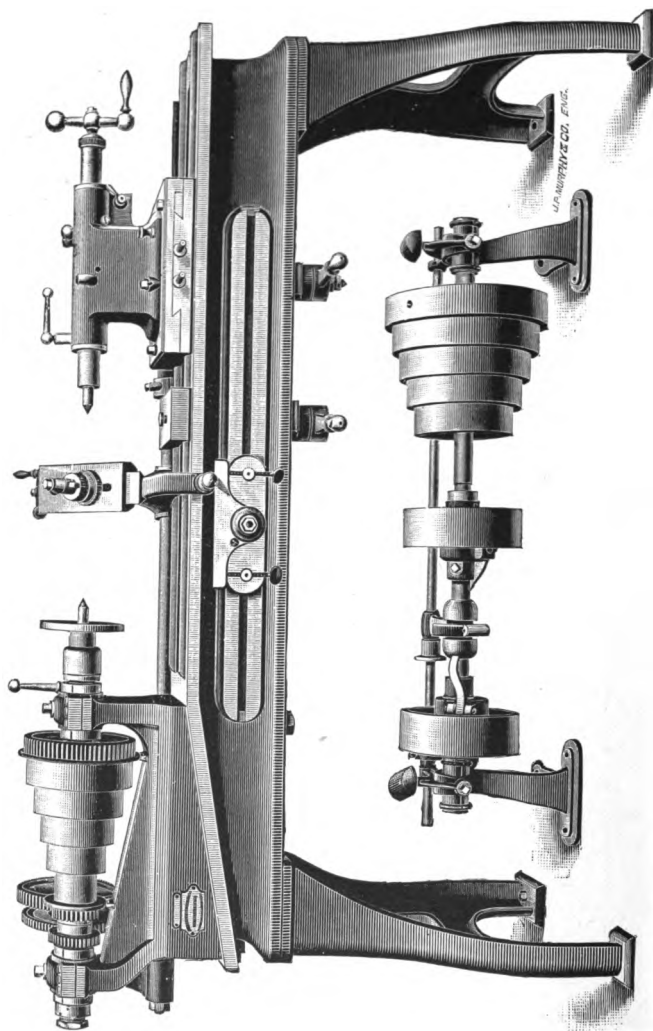
Box Tool.

Leading tools used with Turret Screw and Chucking Machines.

SIZE AND NAME OF MACHINE.	0 and 1 10 in.	2 12 in.	2 1/2 14 in.	3 16 in.	4 18 in.	5 21 in.
Box tool, adjustable	• • • • •					
“ “ with lever slide	• • • • •					
Bushing for holder, split	• • • • •					
Clamp collars for dies and mills, { small large	• • • • •					
Collets for wire feed { for rounds apparatus, { for squares and hexagons	• • • • •					
Chuck, 2 jaws, R. and L. { usual size hand screw, { large size	• • • • •					
Cut-off tool, Johnson's	• • • • •					
Die and tap-holder, with one { small clamp collar, reversing { large	• • • • •					
Dies (spring) U. S. standard { small O. D. and hollow mills, { large O. D.	• • • • •					
Hollow mill holder, without { small collar or bushing, { large	• • • • •					
Hollow mills	• • • • •					
Jaws for R. and L. hand { plain screw chuck, per pair, { hardened	• • • • •					
Rest (box tool) fitted to C. O rest Stop gauge	• • • • •					
Tool post for C. O. rest, each	• • • • •					

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*No. 1 Improved Brass Lathe.*



*Price and description on the opposite page.*



## *No. 1 Improved Brass Lathe.*

**T**HE cut on opposite page represents our Improved Brass Finishers' Lathe, built from entirely new patterns. By means of the inclined plane, the Headstock can almost instantly be raised and lowered, as may be required, to a height to agree with that of the Tailstock. This feature is a desired one and will be appreciated by all who are aiming to do their work well and rapidly.

The Journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting by which the spindle can be kept to a perfect running fit; and all held so rigidly that shaking is impossible.

The Taper Attachment on the front of the bed is an addition that we know will be appreciated by all who have had taper threads to cut with screw apparatus, as the guide bar can be set accurately and quickly.

The Tailstock has all the desirable features of the Square Arbor Tailstock, Swivel, Back Motion and Dove-tail setover.

The construction of the spindle more effectually resists a tendency to partially rotate (when boring is to be done with the spindle), than is effected even with a square spindle and is again superior to that, for when worn enough to produce chattering, it can be adjusted to its original degree of tightness.

Bed is 6 feet long; swings 17 inches, Hollow Spindle, with  $1\frac{1}{8}$  inch hole; Back Gears; Screw Apparatus; Taper Attachment. Swivel, Back Motion, Dove-tail Setover and Overhead Works.

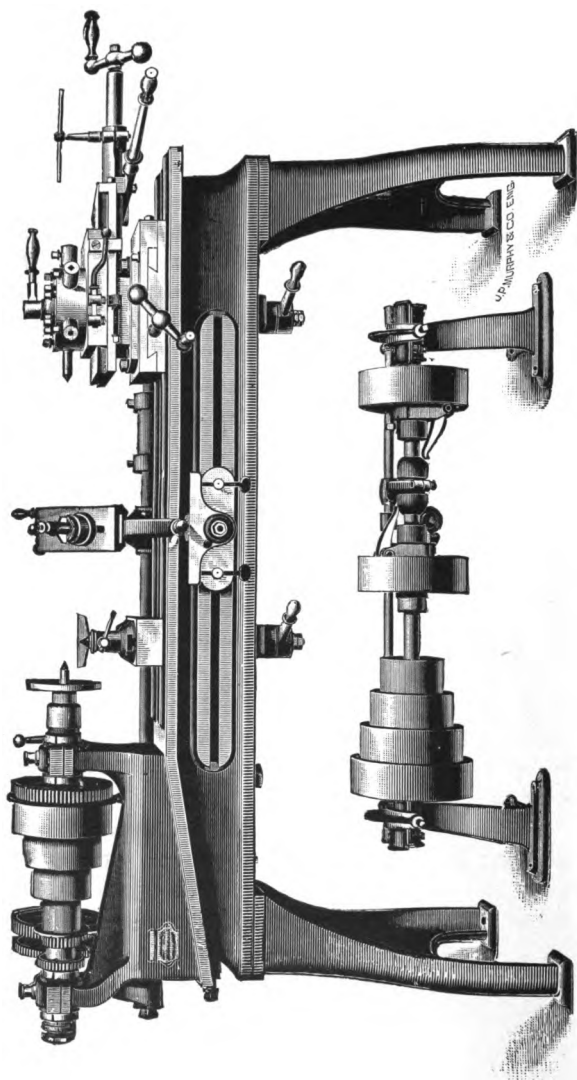
Cone has 5 changes for  $2\frac{1}{4}$  inch belt; counter-shaft with 10 inch  $\times$  3 inch friction pulleys, should make 150 revolutions per minute. Floor space 78 inches by 28 inches.

Shipping Weight 1300 pounds.

---

Price . . . . . \$

*No. 2 Improved Turret Brass Lathe.*



*Description and price on opposite page.*

## ***No. 2 Improved Turret Brass Lathe.***

---

**T**HE most recent production in Lathes for Brass and Iron Workers' use, is represented by cut on opposite page, and we call attention to the improvements described below, which, with the excellence of material and workmanship, make the best lathe for use on brass work of all kinds, and on medium iron work. By means of the inclined plane, the Headstock can almost instantly be raised and lowered as may be required, to a height to agree with that of the Tailstock. This feature is a desired one and will be appreciated by all who are aiming to do their work well and rapidly.

The Journals are large and run in self-oiling bronze boxes that are fitted with arrangement for adjusting by which the spindle can be kept to a perfect running fit; and all held so rigidly that shaking is impossible.

The Taper Attachment on the front of the bed is an addition that we know will be appreciated by all who have had taper threads to cut with Screw Apparatus, as the guide bar can be set accurately and quickly.

As the Headstock can be adjusted to compensate for all downward wear of the Tailstock, and the Turret Head has swivel and setover, it is possible to secure a perfect alignment of centers in every direction at will of the operator, allowing perfect work to be done at all times.

Bed is 6 feet long; swings 18 inches, Hollow Spindle with  $1\frac{1}{8}$  inch hole; Back Gears; Screw Apparatus; Taper Attachment and Overhead Works.

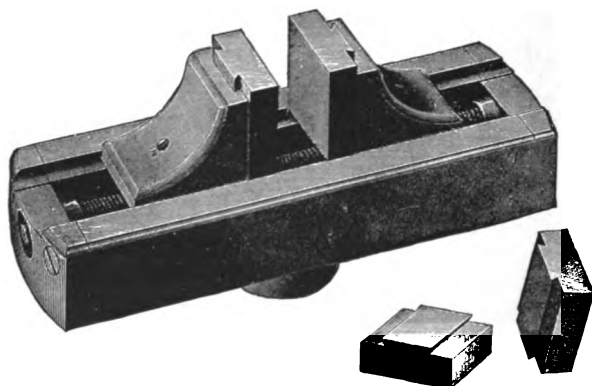
Cone has 4 changes for  $2\frac{3}{4}$  inch belt; counter-shaft with 10 inch  $\times$  3 inch friction pulleys, should make 180 revolutions per minute. Floor space 78 inches by 30 inches.

Shipping Weight 1500 pounds.

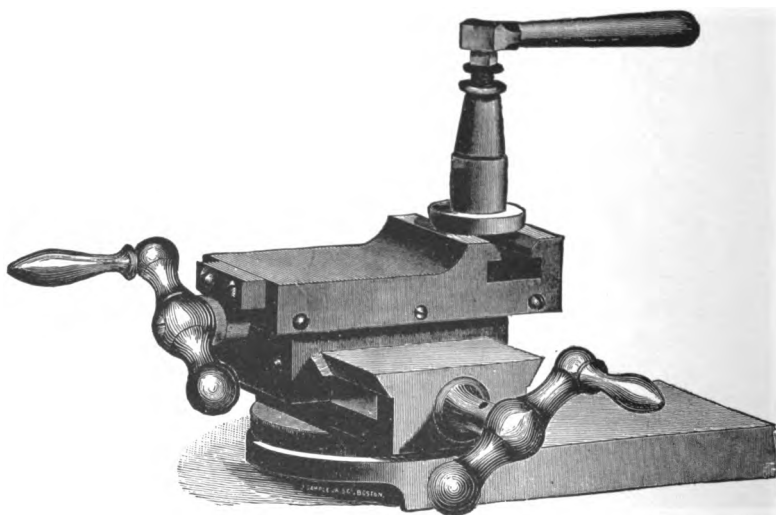
---

Price . . . . . \$

*Two-Jawed Chuck with Box Body*



*Slide Rest for Brass Lathes.*



*Prices of Chucks and Slide Rests on opposite page.*

## Two-Jawed Chucks.

TO BE USED ON BRASS FINISHING LATHES.

CUT at top of opposite page shows our Two-jawed Chuck, with the cast-iron or false jaws in position for use, and also with them detached from the chuck. We make these chucks of two varieties,—one with a connected, or right and left hand screw, which moves the jaws simultaneously to or from the centre; and the other with separate screws, by which either of the jaws can be moved at will.

*Orders should specify which of the two above-described varieties is wanted.*

16 inch chuck, box body . . . . .	\$
14 " " " " . . . . .	
12 " " " " . . . . .	
9 " " " " . . . . .	
7 " " round body . . . . .	
6 " " " " . . . . .	
Blank jaws for 16 and 14 inch chuck . . .	\$ per pair.
" " " 12 inch chuck . . . . .	" "
" " " all smaller sizes . . . . .	" "

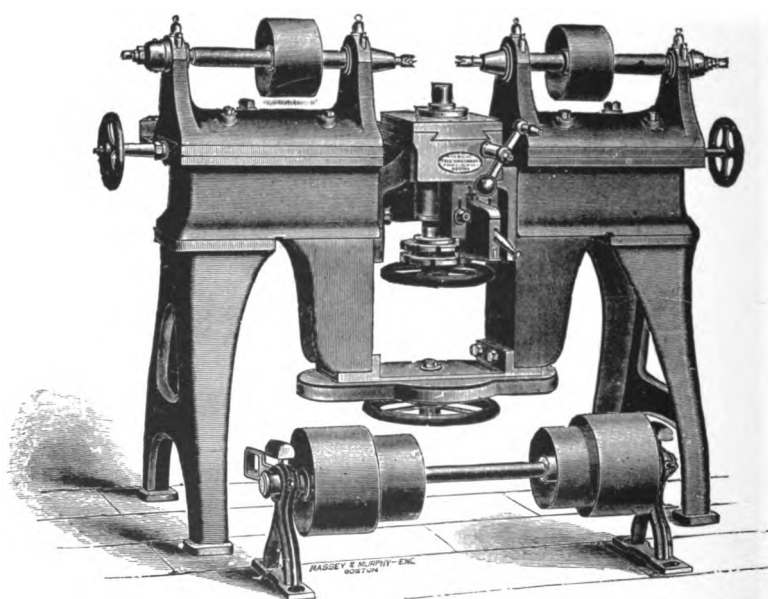
## Slide Rests.

TO BE USED ON BRASS FINISHING LATHES.

CUT at bottom of opposite page shows our plain Slide Rest, of which we have three sizes. They are nicely finished all over. The top slide that holds the tool post is a steel casting.


No. 1 fits 15 inch swing lathe . . . . .	\$
" 2 " 13 " " " . . . . .	
" 3 " 10 " " " . . . . .	

*Valve Milling Machine.*



*Price and description of this machine on opposite page.*

### *Valve Milling Machines.*

 OPPOSITE is a cut representing the large size Valve Milling Machine.

This machine is 9 inches between cutters, and 10 inches from top of elevating spindle to cutter.

Pulleys on spindles, 7 inches diameter, 4 inches face.

Speed of countershaft, 500 revolutions per minute.

Tight and loose pulleys on countershaft, 8 inches diameter, 4 inches face.

Driving-pulley on countershaft, 12 inches diameter, 10 inches face.

**Weight, 1,200 pounds.**

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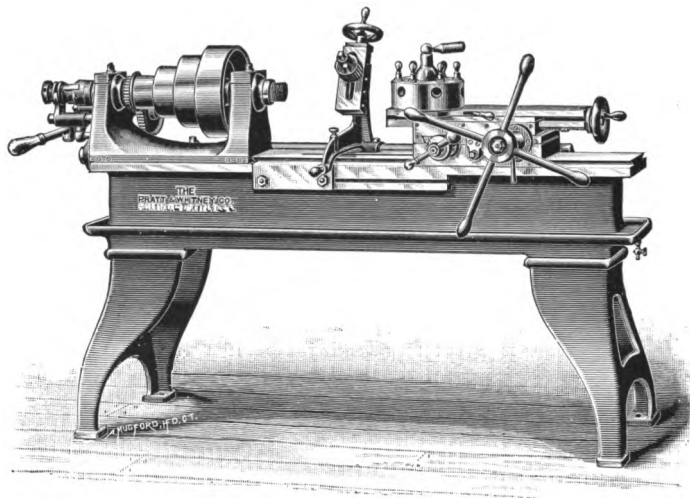
Price . . . . . \$

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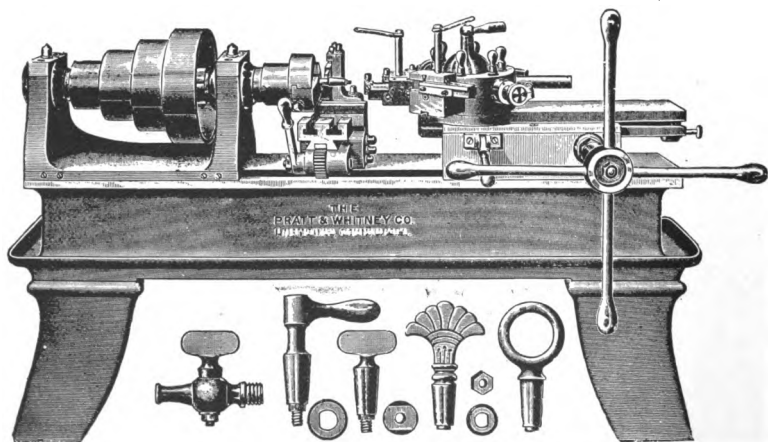
**Smaller size Valve Milling Machine, price, \$**

## *Brass Finishing Machine.*

WITH CHASING ATTACHMENT.



## *Lathe for Brass Cocks.*





### ***Pratt & Whitney Brass Finishing Machines.***

THE cut at top of opposite page shows a 16-inch brass working lathe with chasing apparatus. This lathe has all the regular features, hollow light feed-bar, with arrangement for chasing taper threads and cross feed for turret, and it has the additional features of the draw back collet mechanism described on page 87, taking stock to  $\frac{7}{8}$ -inch. The turret has an extra fine feed hand-wheel and screw, and this, and the cross feed hand-wheel are indexed 128 to the inch. The machine is built with a swivel on the turret slide for turning tapers.

Friction pulleys 12 x 4 inches. Revolutions 520.

**Weight 1,750 pounds.**

---

Price, . . . . . \$

---

### ***Brass Lathe for turning Brass Cocks and other Brass Work.***

THE machine opposite, 14-inch swing, shows the tools in place, including the box tool rest described on page 88, will work out 200 to 400 brass cocks per day,  $\frac{1}{2}$  to  $1\frac{1}{4}$ -inch diameter, giving any desired uniform taper. The following tools are included in price : Right and left screw chuck, box tool rest with taper guide block, turret slide binder, back centering fixture, bell centre, patent taper box tool for roughing and finishing cuts, milling tool for finishing necks, die holder and die.

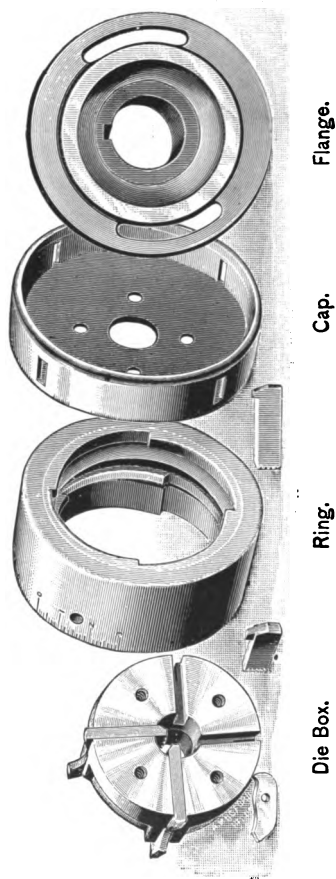
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Price, . . . . . \$

*Head and Die of the Merriman Bolt Cutter.*



No. 2 Die. Full Size.



Die Box.

Ring.

Cap.

Flange.

### *The Merriman Bolt Cutter.*

THIS bolt cutter has long been known for its simplicity and the good quality of the work produced by it. The manufacturers are now changing their patterns with a view of building much heavier and more solid machines than ever before.

The construction of head is shown by the cuts opposite. The ring, sliding forward over die box, forces dies down and holds them *solidly* by the flat top of dies. The dies can be changed within 30 seconds. The machine is of course a four die machine the only form which will do perfect work.

It is supplied with oiling apparatus as shown in cuts of machines or at a slightly increased expense, with oil pumps. An adjustable attachment for automatically opening the dies is also supplied at small extra expense.

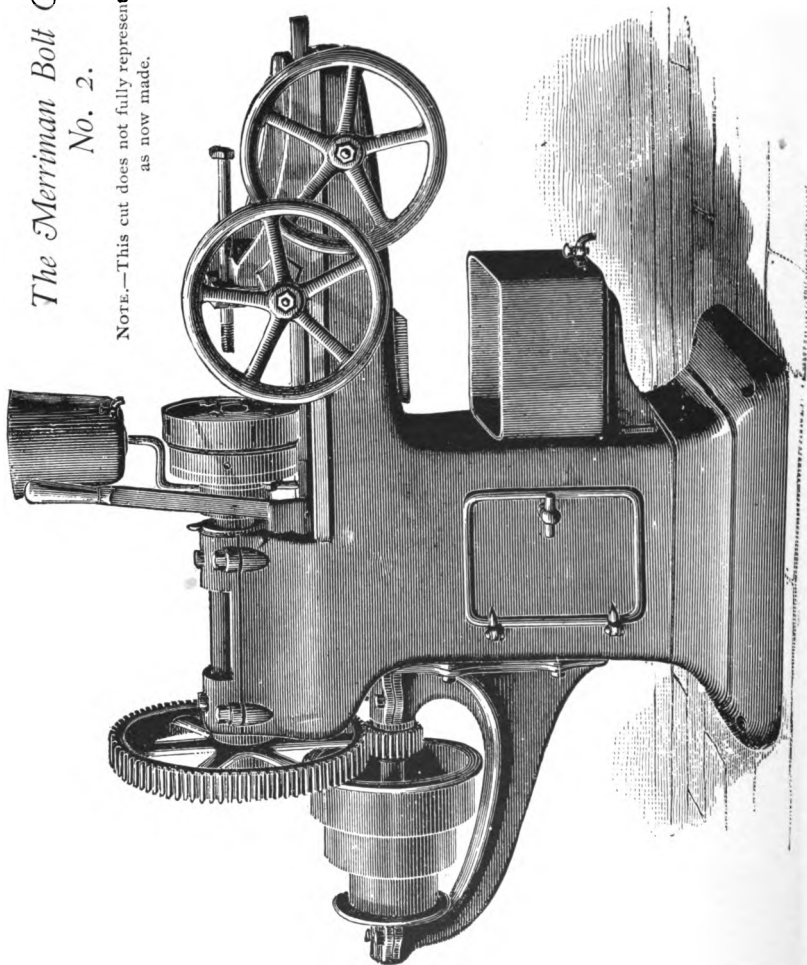
Dies of either United States, V., Whitworth or metric thread supplied with the machine; also left hand dies and pipe dies at extra cost.

Double machines for railroad work or otherwise.

*The Merriman Bolt Cutter,*

*No. 2.*

NOTE.—This cut does not fully represent the machine  
as now made.



## The Merriman Bolt Cutter.

### SCHEDULE OF SIZES.

**W**E usually fit these machines, for cutting bolts and tapping the nuts, according to the following schedule of sizes:  
**Size No. 1.** Diameter of bolt and nuts,  $\frac{1}{4}$ ,  $1\frac{1}{8}$ ,  $\frac{3}{8}$ ,  $1\frac{7}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$  inches.

Speed of countershaft 125, diameter of pulley 12 inches, 3-inch face. Weight, complete, 600 lbs.

This machine is not geared, but has a cone of three pulleys, each 3 inches broad, giving ample power and variations of speed. Intended for doing light work very rapidly.

**Price, No. 1 . . . . . \$**

**Size No. 2.** (see cut opposite.) Diameter of bolt,  $\frac{3}{8}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ , 1,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{3}{8}$ ,  $1\frac{1}{2}$  inches.

Speed of countershaft 150, diameter of pulley 12 inches, 3-inch face. Weight, complete, 1,000 lbs.

This size machine is intended for medium sized work. It is very effective in railroad and general machine shops, general jobbing, etc., etc.

**Price, No. 2 . . . . . \$**

**Size No. 3.** Diameter of bolt,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ , 1,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{3}{8}$ ,  $1\frac{1}{2}$ ,  $1\frac{5}{8}$ ,  $1\frac{3}{4}$ ,  $1\frac{7}{8}$ , 2 inches.

Speed of countershaft 150, diameter of pulley 16 inches,  $4\frac{1}{2}$ -inch face. Weight, about 2,200 lbs.

This is a heavy back-geared machine, so arranged as to give eight changes of speed, thus fitting it for a large range of work, from very large down to moderately small, and doing any size with celerity.

**Price, No. 3 . . . . . \$**

With all machines are furnished dies and taps ready for use, oiling apparatus, tap holders for holding taps when tapping nuts, dies for holding bolts and nuts, also countershafts and wrenches.

United States Standard of threads supplied unless otherwise ordered. Taps, unless otherwise ordered, made  $\frac{1}{32}$  inch over size for rough iron work.

**Hobs for recutting dies, extra . . . . . Price, \$**

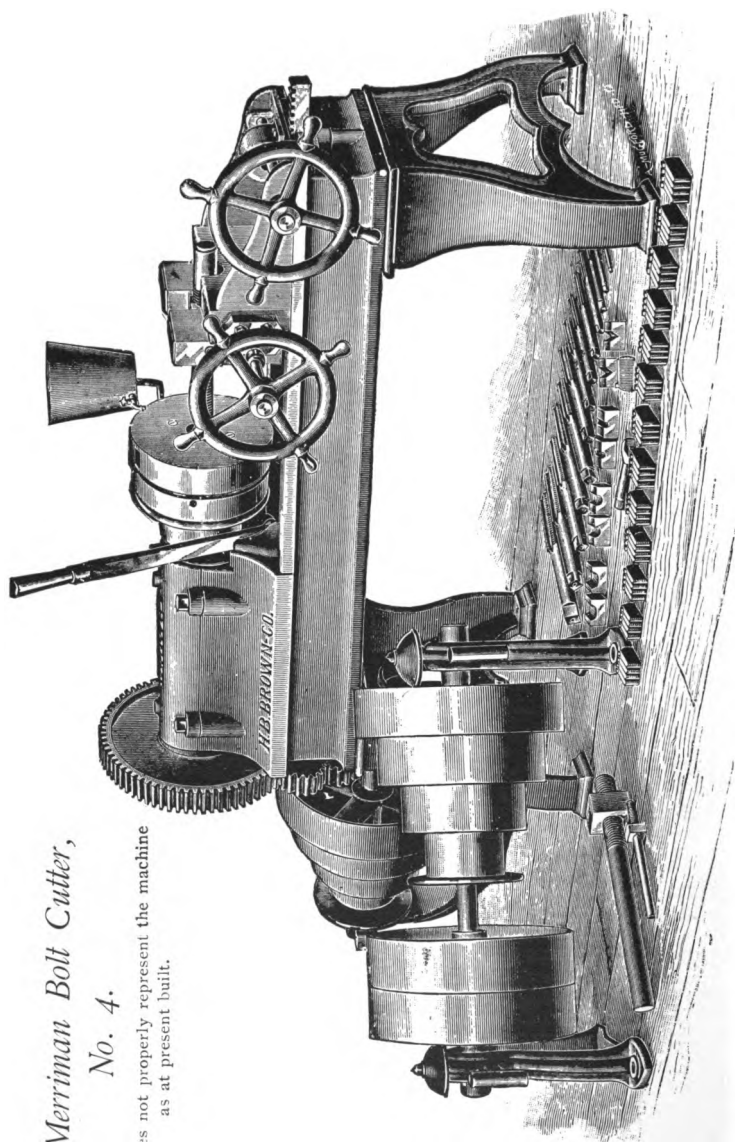
**Oil pumps " . . . . . "**

**Automatic attachment for opening dies, extra "**

*The Merriman Bolt Cutter,*

*No. 4.*

This cut does not properly represent the machine  
as at present built.



## *The Merriman Bolt Cutter.*

### SCHEDULE OF SIZES.

**Size No. 4.** Diameter of bolt,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{3}{4}$ ,  $\frac{7}{8}$ , 1,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{3}{8}$ ,  $1\frac{1}{2}$ ,  $1\frac{5}{8}$ ,  $1\frac{3}{4}$ ,  $1\frac{7}{8}$ , 2,  $2\frac{1}{4}$ ,  $2\frac{1}{2}$  inches.

Speed of countershaft 150, diameter of pulley 16 inches,  $4\frac{1}{2}$ -inch face. Weight, about 2,600 lbs.

This, like the No. 3, is a heavy back-geared machine, intended for bridge and other bolt work.

Price, No. 4 . . . . . \$

**Size No. 5.** Diameter of bolt, 1,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{3}{8}$ ,  $1\frac{1}{2}$ ,  $1\frac{5}{8}$ ,  $1\frac{3}{4}$ ,  $1\frac{7}{8}$ , 2,  $2\frac{1}{4}$ ,  $2\frac{1}{2}$ ,  $2\frac{3}{4}$ , 3 inches.

Speed of countershaft 100, diameter of pulley 18 inches,  $4\frac{1}{2}$ -inch face. Weight, about 3,200 lbs.

This machine is back-geared like a lathe, has eight speeds, and the holding vise has two screws geared together, so that it is capable of holding securely the heaviest work, or of tapping the heaviest nuts. It is intended for doing a very large range of work, from small to very heavy bolts.

Price, No. 5 . . . . . \$

**Size No. 6.** Diameter of bolt, 1,  $1\frac{1}{8}$ ,  $1\frac{1}{4}$ ,  $1\frac{3}{8}$ ,  $1\frac{1}{2}$ ,  $1\frac{5}{8}$ ,  $1\frac{3}{4}$ ,  $1\frac{7}{8}$ , 2,  $2\frac{1}{4}$ ,  $2\frac{1}{2}$ ,  $2\frac{3}{4}$ , 3,  $3\frac{1}{4}$ ,  $3\frac{1}{2}$ ,  $3\frac{3}{4}$ , 4 inches.

This machine can be fitted to cut to  $4\frac{1}{2}$  inches if desired. It is a very strongly-geared tool, capable of doing its heaviest work with facility.

Price, No. 6 . . . . . \$

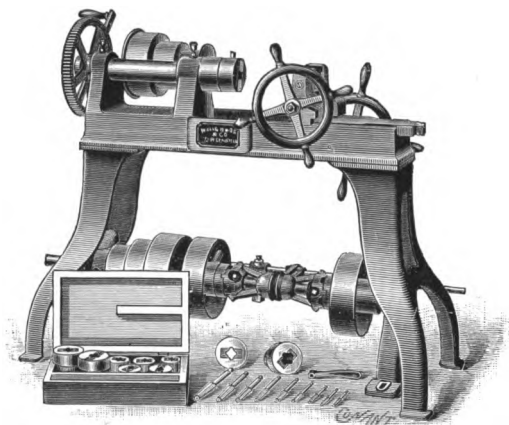
These sizes can be supplied, if desired, with power feed and lead screw. One lead screw will serve for all pitches of screw and the changes will be made by change gears as with a lathe.

Price, lead screw and power feed, No. 4 . . \$

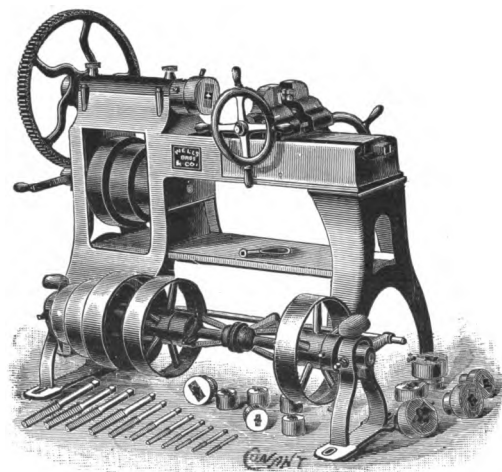
“	“	“	“	“	5	. .
“	“	“	“	“	6	. .

Details and extras supplied with these machines are the same as with the No. 1, 2 and 3, described on page 105.

*Little Giant Bolt Cutters and Nut Tappers.*



Nos. 10 and 10½ Power Bolt Cutter and Nut Tapper.



No. 12 Power Bolt Cutter and Nut Tapper.

*Details and prices of these machines on opposite page.*



## *Little Giant Bolt Cutter and Nut Tapper.* **FOR HAND OR POWER.**

*Made by Wells Brothers.*

**ASSORTMENT No. 10** cuts  $\frac{1}{4}^{20}$ ,  $\frac{5}{16}^{18}$ ,  $\frac{3}{8}^{16}$ ,  $\frac{7}{16}^{14}$ ,  $\frac{1}{2}^{12}$ ,  $\frac{5}{8}^{10}$ ,  $\frac{3}{4}^{10}$ ,  $\frac{7}{8}^9$ ,  $1^8$ .

Machine complete, with plain countershaft, tap chuck, taps, adjustable dies and collets.

Price . . . . . \$

“ extra, for friction clutch on countershaft . . . . . 10.00

**Assortment No. 10½** cuts  $\frac{1}{4}^{20}$ ,  $\frac{5}{16}^{18}$ ,  $\frac{3}{8}^{16}$ ,  $\frac{7}{16}^{14}$ ,  $\frac{1}{2}^{12}$ ,  $\frac{5}{8}^{10}$ ,  $\frac{3}{4}^{10}$ ,  $\frac{7}{8}^{11}$ ,  $1^8$ ,  $1\frac{1}{8}^8$ ,  $1\frac{1}{4}^7$ .

Machine complete, with plain countershaft, tap chuck, taps, adjustable dies and collets.

Price . . . . . \$

“ extra, for friction clutch on countershaft . . . . . 10.00

Speed of countershaft, 250 revolutions per minute.

**Weight of machine, 600 pounds.**

**Assortment No. 12** cuts  $\frac{3}{8}^{16}$ ,  $\frac{7}{16}^{14}$ ,  $\frac{1}{2}^{12}$ ,  $\frac{5}{8}^{10}$ ,  $\frac{3}{4}^{10}$ ,  $\frac{7}{8}^9$ ,  $1^8$ ,  $1\frac{1}{8}^8$ ,  $1\frac{1}{4}^7$ ,  $1\frac{3}{8}^6$ ,  $1\frac{1}{2}^6$ .

Machine complete, with plain countershaft, tap chuck, taps, adjustable dies and collets.

Price . . . . . \$

“ extra, for friction clutch on countershaft . . . . . 10.00

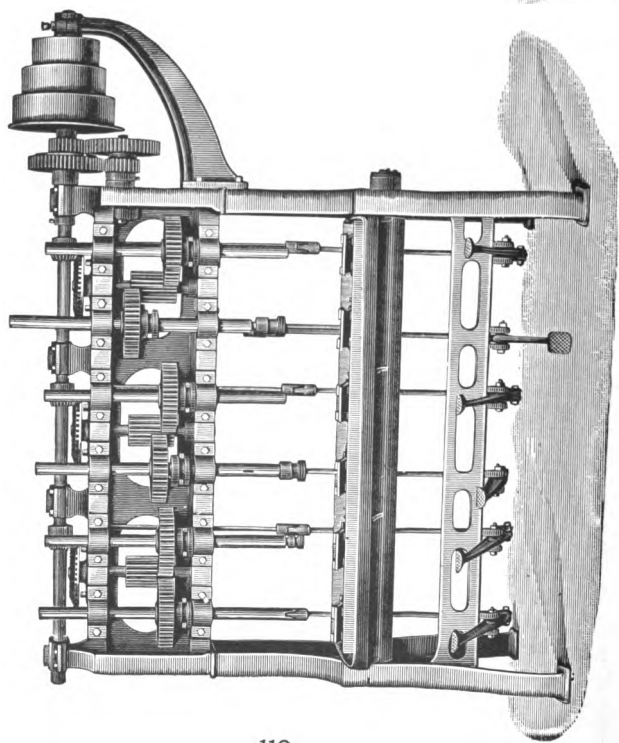
Speed of countershaft, 200 revolutions per minute.

**Weight of machine complete, 850 pounds.**

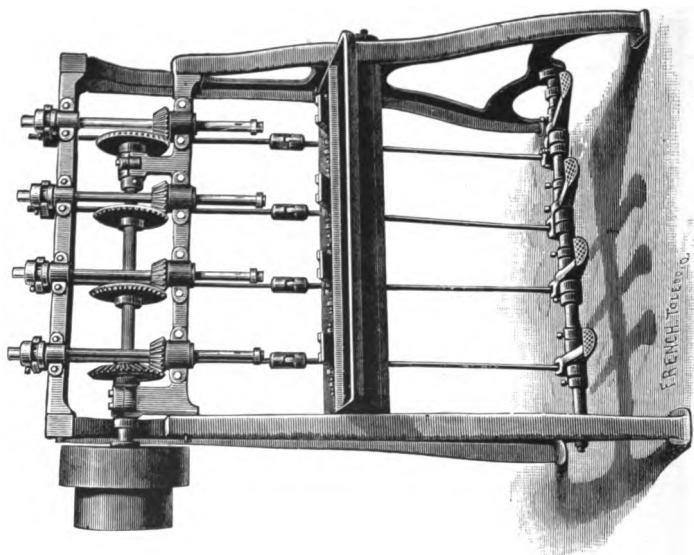
Three-step cone pulley, with steps  $3\frac{1}{2} \times 8$ , 10, 12 inches. Large gear, 18 inches diameter. Small gear, 3 inches, giving great power.

We furnish all these machines with V threads and over size, unless otherwise ordered. But, if desired, Franklin Institute or Whitworth threads are furnished at same prices.

*National Back Geared Tapper. Taps to 1½ in.*



*National Light Skew Geared Tapper.  
4-Spindle.*



## *National Nut Tappers.*

**W**E offer the Nut Tappers illustrated on the opposite page as machines of excellent workmanship and of the most efficient character both in the quality and amount of production. Spindles are held in babbetted boxes and run true. They are all independent. Nuts lie on a flat surface and must be tapped true. Spindles balanced or weighted as required. Taps run in oil on the surface of water just covering the nut.

These Nut Tappers are made to run by belt or with skew gears as illustrated opposite.

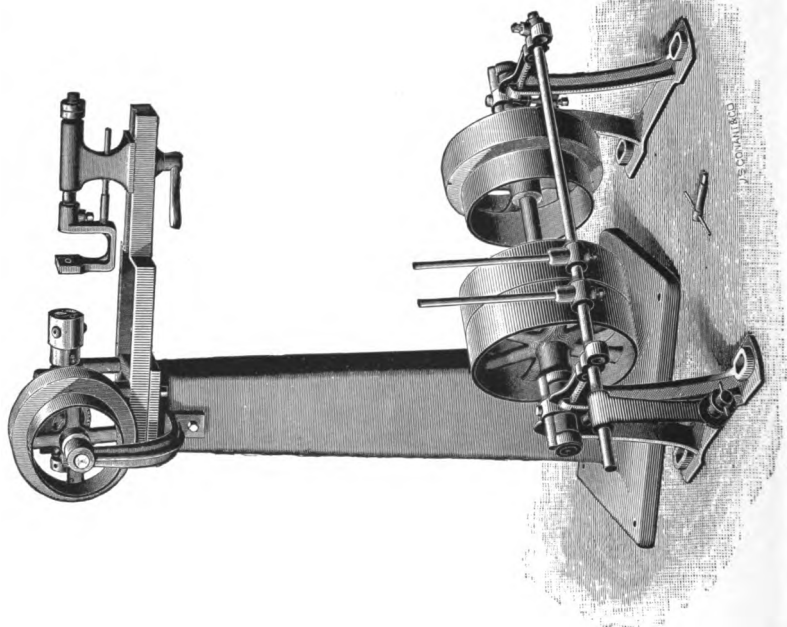
The lower cut opposite illustrates the heavier size back geared.

Rotary tappers are also supplied either hand raising or automatic. The latter are specially adapted to railroad and other large shops.

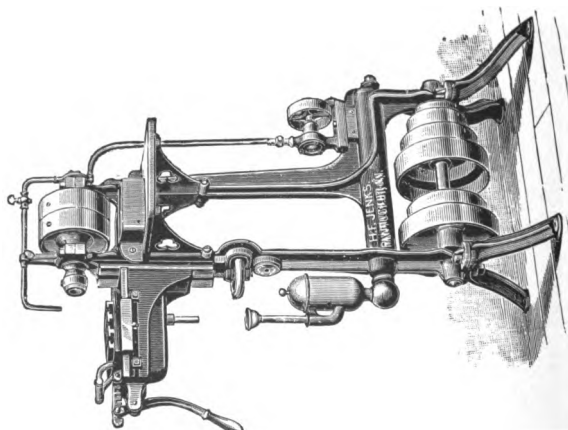
### DETAILS AND PRICES.

	With Skew Gear.	With belt.
4 Spindle, taps to $\frac{1}{2}$ inch, countershaft speed 120 rev. Price with countershaft . . . . .		
5 Spindle, taps to $\frac{3}{8}$ inch, countershaft speed 206 rev. Price with countershaft . . . . .		
6 Spindle, taps to 1 inch, countershaft speed 240 rev. Price with countershaft . . . . .		
6 Spindle, taps to $1\frac{1}{4}$ inch, with back gear, countershaft speed 240 rev. Price with countershaft . . . . .		
The above includes one tap holder for each Spindle.		
Plain sockets for 4 and 5 Spindle tappers, each \$ . . . . .		
Patent \$ . . . . .		
Plain sockets for 6 Spindle tappers, each \$ . . . . .		
Patent \$ . . . . .		
6 Spindle back geared, taps to $1\frac{1}{2}$ inch, countershaft speed 275 rev. . . . .		
Plain taps to 1 inch. Patent \$ . . . . .		
Plain taps to $1\frac{1}{2}$ inch. Patent \$ . . . . .		
6 Spindle rotary tapper, hand raising, countershaft speed 150 to 175 rev. . . . .		
6 Spindle rotary tapper, automatic . . . . .		

*Woodward & Rogers Tapping Machine.*



*Jenks Improved  
Drilling & Threading Machines.*



No. 1. Patents Intended.

## *Tapping Machine.*

*Made by Woodward & Rogers.*

---

**D**ESIGNED for manufacturers of sewing machines, fire-arms, electric lamps, locks, clocks, hardware, etc.

This machine is self-reversing by pressing the work against the tap, and drawing it in the opposite direction when it is finished; check nuts on the end of the spindle govern the depth to be tapped, when the tap is not required to pass through.

A universal chuck holding from 0 to  $\frac{1}{2}$  inch is a part of the machine.

It can be used for drilling by attaching a lever to the foot block spindle; the clutch being held from reversing by a set screw.

Drilling attachment furnished when desired.

---

Tight and loose pulleys,  $10 \times 2\frac{1}{2}$  inches. Speed of countershaft, 140 revolutions per minute.

---

Price, with suitable countershaft . . . . .	\$
“ extra of drilling attachment . . . . .	

---

## *Jenks Improved Drilling and Threading Machines.*

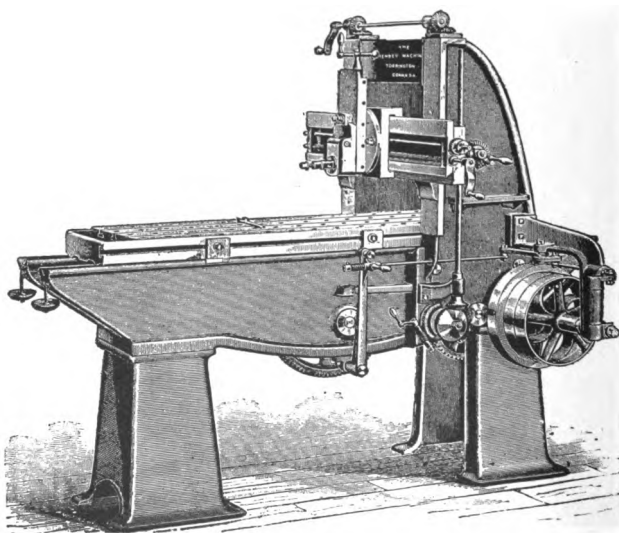
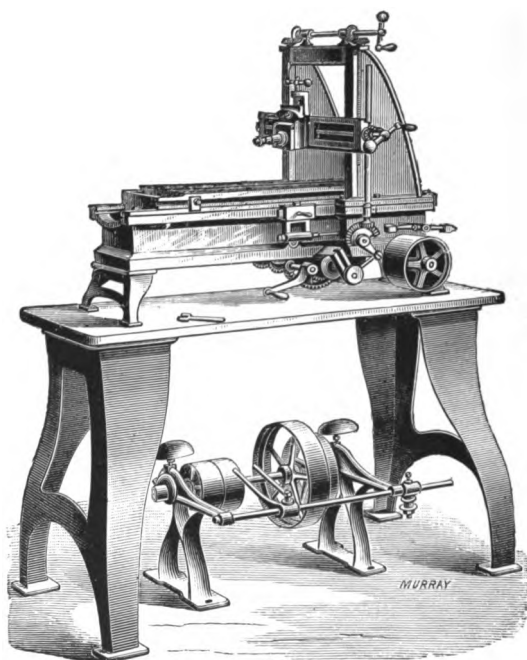
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**T**HE cut of machine explains itself. Work attached to the table is of necessity accurately aligned for tapping. Holes may be tapped to the bottom without breaking taps. Adjustable stops determine depth of hole. Machine is well adapted to tapping nuts and cutting small bolts, spindle being hollow.

Taps from  $\frac{1}{16}$  to  $\frac{5}{8}$  inch.

---

Price, . . . . .	\$
------------------	----



### *Hand and Power Planer.*

Planes 10 x 10 x 24 inches.

**C**UT on opposite page represents a combination Hand and Power Planer. Machine is powerful and very accurately made, has automatic horizontal feed. Head graduated to plane to any angle. Price includes chuck and indexed centres, crank for hand power, countershaft, etc.

Tight and loose pulleys, 6 X 2 inches.    **Revolutions 170.**

Price, . . . . . \$

### *16 Inch Iron Planer.*

**R**EPRESENTED on the opposite page is a Geared Friction Planer, which planes 16 inches wide, 16 inches high, and 4 feet in length. It is strong and heavy in all its parts, and has automatic horizontal, vertical, and angular feed. It has quick return to the table. The belts on this planer never change from their track like a shifting belt planer, whereby is secured a saving in belts, and the disagreeable squealing noise of shifting belts is avoided.

Tight and loose pulleys, 12 X 3 inches.    **Revolutions 395.**

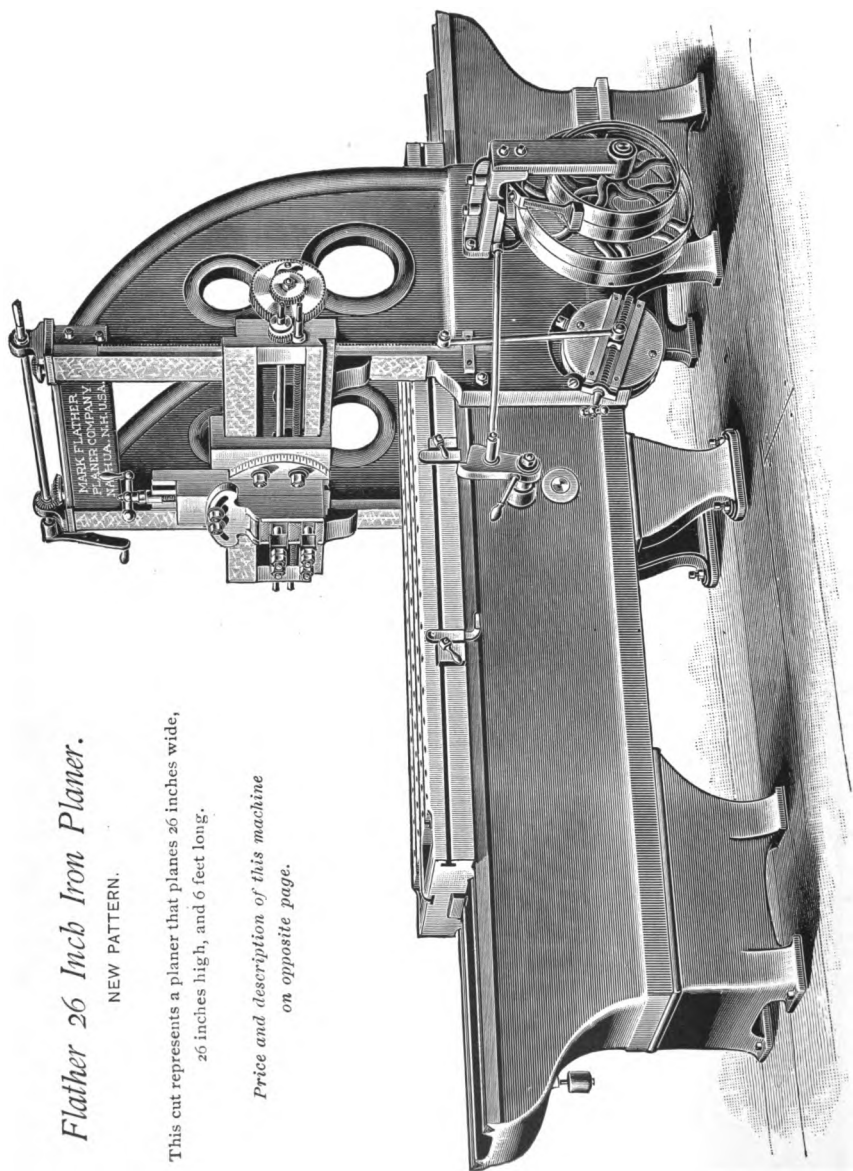
Price, . . . . . \$

## *Flather 26 Incb Iron Planer.*

NEW PATTERN.

This cut represents a planer that planes 26 inches wide,  
26 inches high, and 6 feet long.

*Price and description of this machine  
on opposite page.*





## *Iron Planers.*

*Made by the Mark Flather Planer Co.*

**T**HESE Planers have been designed to meet the requirements of manufacturers who want a heavy, solid machine, which is also as handy as those of lighter weight. The uprights, extending well back, are also very heavy and well braced; they are scraped, keyed, and fastened with large bolts in reamed holes. Belt shifter is entirely disconnected from feeding apparatus, and is arranged to throw out to clear reversing dogs on the table, which can then be run back to examine work without changing position of dogs.

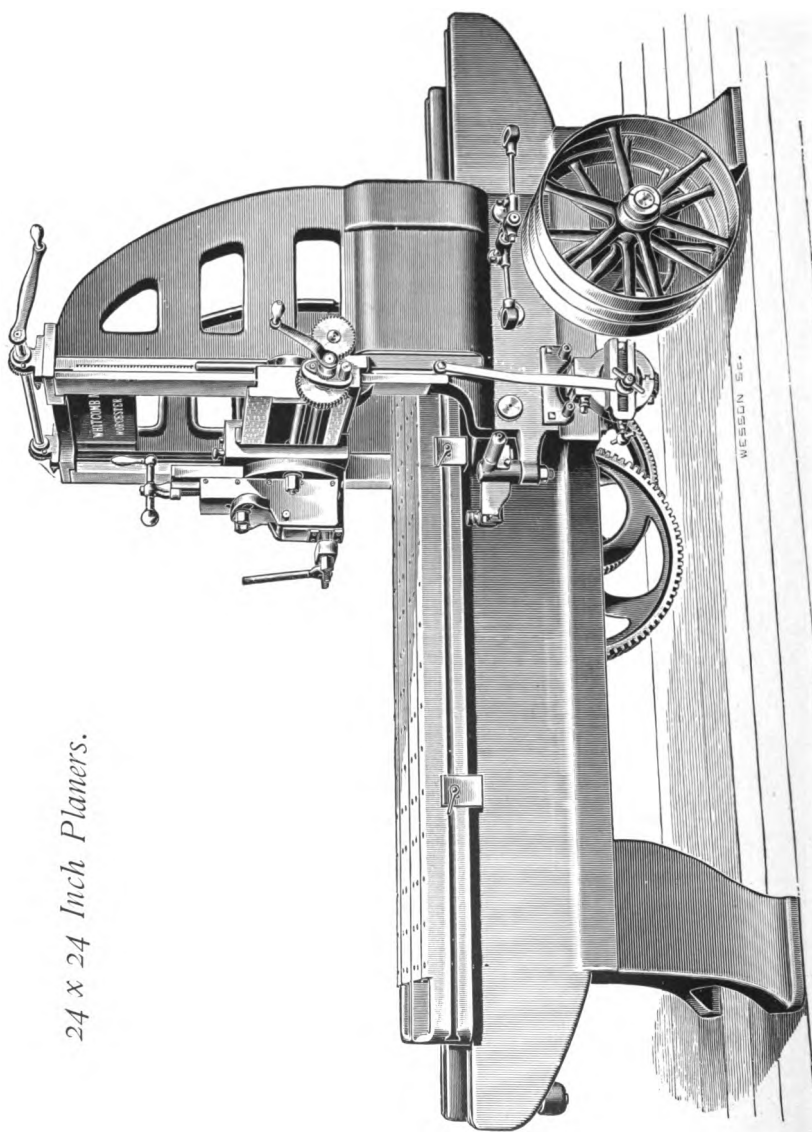
The feeding device is positive, giving automatic feed in all directions. It is adjustable from 0 to  $\frac{3}{16}$  inch wide, and takes no power except at moment of feeding. The down feed screw of cross-head has two nuts, and provision is made for taking up all lost motion, preventing any tendency of the tool to drop.

All straight surfaces that are fitted are scraped to surface plates; all shafts and screws subject to wear or strains are made of best machinery steel; all wrenches drop forged and hardened, and all nuts and screws subject to bruising strains are case-hardened.

### DETAILS AND PRICES.

	22 Inch.	24 Inch.	27 Inch.	30 Inch.
Standard lengths . . .	5-foot.	6-foot.	6-foot.	8-foot.
Weight standard lengths	4,400 lbs.	5,100 lbs.	7,000 lbs.	8,500 lbs.
Size and face counter pulley . . . . .	12 x 4 in.	12 x 4 in.	12 x 4 in.	14 x 4 in.
Revolutions countershaft	285	300	315	325
Price, standard lengths				
Price, extra, per foot . .				

*24 x 24 Inch Planers.*



### *Iron Planers.*

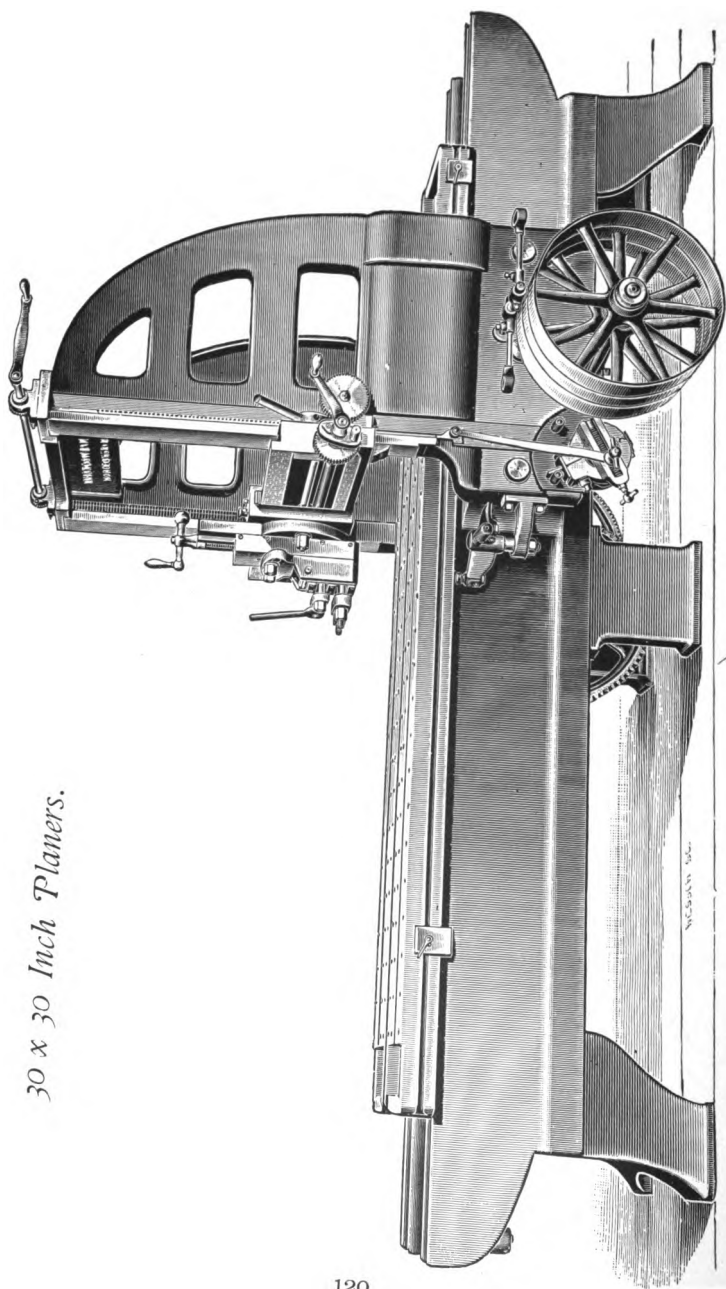
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**V**ERY heavy machines, substantial, and well proportioned in all parts, with large steel shafting, extra long bearings, and cap boxes. Gears and racks all cut from solid blanks. Crosshead fits all scraped. Holes in table drilled and reamed. Slots in table planed from the solid. Best self-acting horizontal, vertical, and angular feeds. Quick return. Patent crosshead fastening, operating instantaneously, effectual and durable. Patent friction feed, entirely disconnected from shipper. Patent track lubricators; an exceedingly valuable device, which keeps tracks perfectly oiled, thereby preventing grinding. Offsets in uprights increase capacity of machine by about three inches in width for six inches above the table. Countershaft and wrenches with each machine.

---

*For details see next pages.*

*30 x 30 Inch Planers.*



# Iron Planers.

*Illustrated on pages 118-120.*

## DETAILS AND PRICES.

	17 Inch.	22 Inch.	24 Inch.	27 Inch.	30 Inch.	36 Inch.
Standard length of table . . .	4 feet.	5 feet.	6 feet.	6 feet.	8 feet.	10 feet.
Weight, with standard table . .	2,800 lbs.	4,400 lbs.	5,800 lbs.	6,400 lbs.	8,000 lbs.	14,000 lbs.
Diam. and face counter pulleys	10 x 3 in.	11 x 4 in.	12 x 4 in.	12 x 4 in.	12 x 4 in.	12 x 5 in.
Revolutions countershaft . .	200	200	250	250	250	320
Price, with standard table . .						
Price, extra, per foot . . . .						

Offsets in 17-inch increase capacity by about two inches for five inches above the table. In 24, 27 and 30-inch they increase width about three inches for six inches in height.

PLANES 28 x 28 IN. x 8 FT.	
Weight,	8000 lbs.
6 feet,	7000 "
0 "	9000 "

PLANES 28 x 28 IN. x 8 FT.

	Shipping Weight,	.	.	.	.	8000 lbs.
<b>Weight 6 feet,</b>	.	.	.	.	.	7000 "
" " 10 "	.	.	.	.	.	9000 "

### *Iron Planers.*

---

*Made by the L. W. Pond Machine Co.*

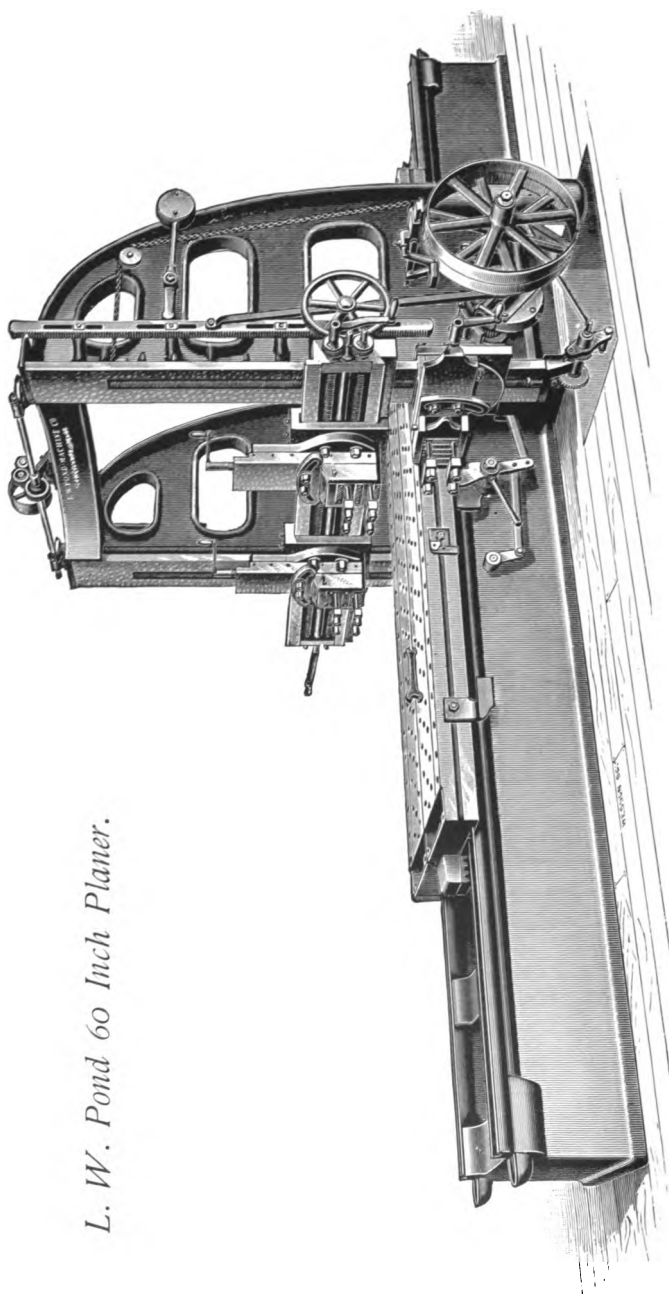
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**T**HESE tools are from new patterns which have been the subject of very careful study, and the machines are designed to be up to the very latest practice in the quality and quantity of work produced and in the details of manufacture. While the weights are heavy, attention has been given to such a distribution of material as shall best meet the strains. Beds are unusually deep and long for the tables, and are wider than common between V's. Tables have drilled holes outside the pockets for packing work. Uprights are very heavy, firmly fastened to bed by steel taper bolts. Cross bars specially heavy. Feed simple and strong. Belts follow in shifting. All working parts carefully scraped. Pinions of steel, gears best "Bessimer pig," sizes are  $\frac{1}{2}$  inch larger than rated to allow for rough castings.

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*For details of these tools see next page.*

*L. W. Pond 60 Inch Planer.*





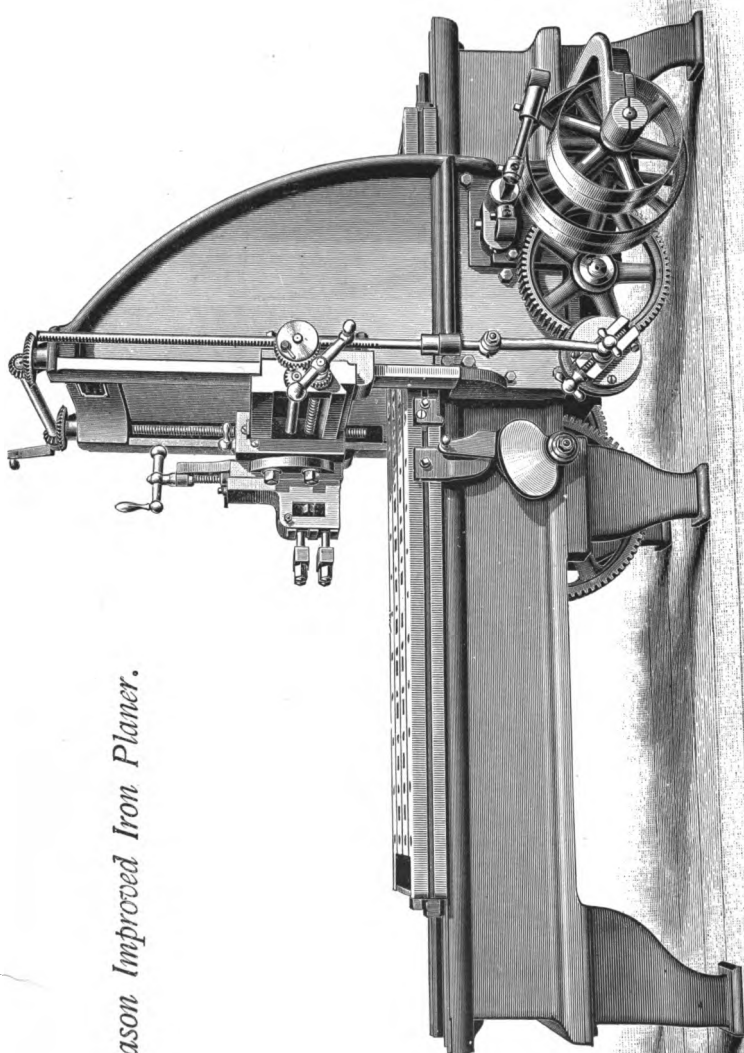
# L. W. Pond Planers.

## DETAILS AND PRICES.

	24 Inch.	28 Inch.	30 Inch.	32 Inch.	38 Inch.	44 Inch.	48 Inch.	52 Inch.	60 Inch.	72 Inch.
Standard length . . . . .	6 feet.	6 feet.	6 feet.	8 feet.	10 feet.	10 feet.	10 feet.	12 feet.	14 feet.	14 feet.
Weight of standard length . . .	5500 lbs.	7000 lbs.	7500 lbs.	10,700 lbs.	16,500 lbs.	21,000 lbs.	23,000 lbs.	30,500 lbs.	37,000 lbs.	48,500 lbs.
Price of standard length . . . .										
Price, per foot, extra . . . . .										
Price, extra head on rail . . . .										
Price, extra head on upright . . .										
Size counter pulleys . . . . .	12 x 4 in.	12 x 4 in.	12 x 4 in.	12 x 7 in.	12 x 7 in.	12 x 7 in.	12 x 7 in.	15 x 8 in.	15 x 9 in.	15 x 9 in.
Revolutions counter pulleys . . .	325	319	319	415	455	366	366	385	300	300

In addition to the standard sizes, we are offering as a specialty, "Dutchman" planers, designed for manufacturers requiring a medium weight planer of great width, such as ship builders, boiler makers, manufacturers of wood-working machinery, etc. Sizes of this form of machine are: 50 x 44 inch, 60 x 44 inch, 66 x 44 inch, 72 x 44 inch.

*Gleason Improved Iron Planer.*



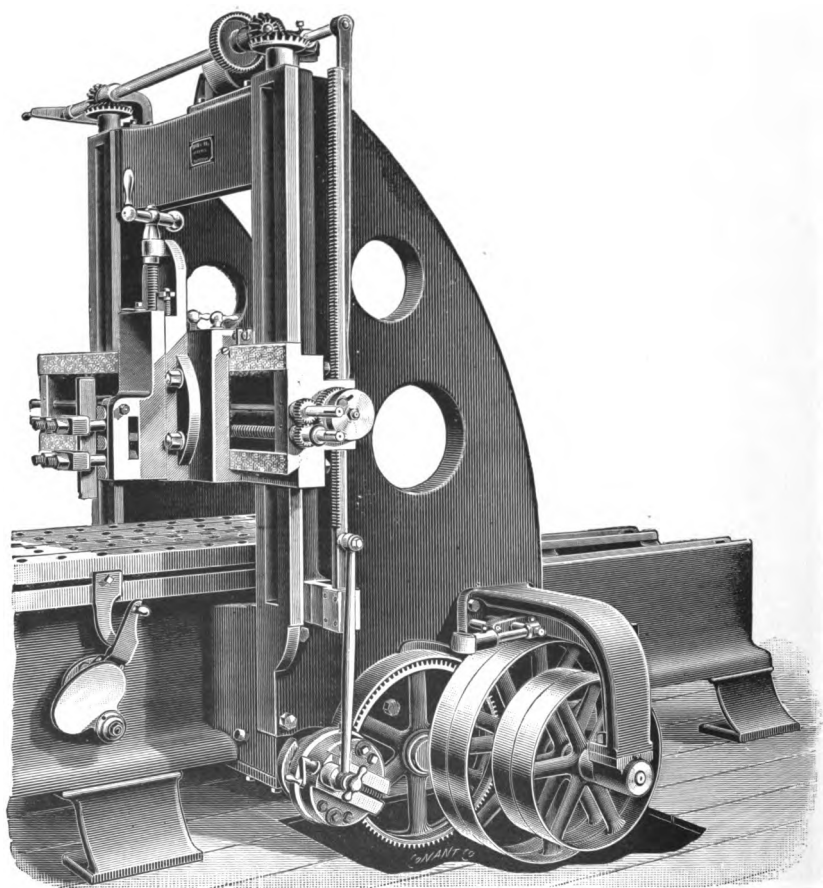
## *Gleason Iron Planers.*

*Made by the Gleason Tool Co.*

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THESE Planers are very heavy and powerful, and are made from entirely new patterns; the beds are very deep, thoroughly braced by heavy box girts cored out from the under side. The shafts are large, have long bearings, with cap boxes; racks and gears have wide faces, and are all machine cut and smooth running. The table is geared to return three times speed of cut, and, by means of new patent belt-shifting arrangement, reverses without noise or jar. Crossheads are wide and heavily ribbed. The large planers are provided with arrangement for raising or lowering crossheads by power. Tool post has patented arrangement by means of which it may be swung to any desired angle, making it unnecessary to back out the tool or to use hooked tools for under cutting. The feed gear is simple, and on the large planers can be operated from either side; has automatic, cross, vertical, and angular feeds. The vertical feed-screw is provided with a very reliable and convenient arrangement for taking up lost motion or wear, by means of a jam nut, which can be instantly locked at any desired adjustment. Beds are made long, so that table overhangs but little at either end when planing full length. Tables, unless otherwise ordered, are made with three T-slots planed the entire length, with a row of rectangular holes on each side of the central slot, and two or more outer rows of holes drilled and reamed. Uprights are made very strong and wide, giving great strength to the cut when working to full height that the machine will admit. Pulley-shafts, countershafts, feed-screws, etc., are made from hard crucible steel. The small quick-running pinion gear on the pulley-shaft is made of raw-hide, insuring smooth and noiseless running. This raw-hide gear has been used by Mr. Gleason for a great many years with splendid results.

*36 Inch Gleason Planer.*



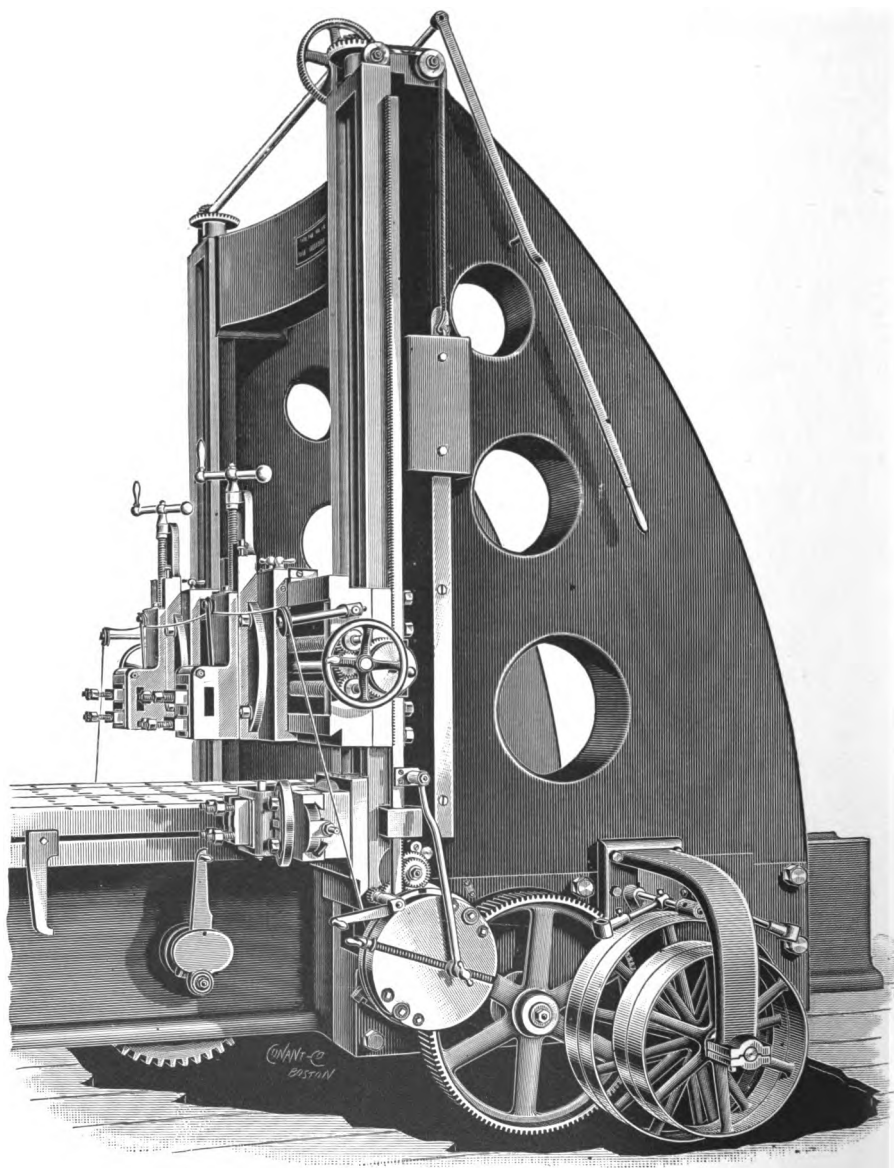
# Gleason Planers.

## DETAILS AND PRICES.

	32 Inch.	36 Inch.	42 Inch. Light.	42 Inch. Heavy.	48 Inch.	54 Inch.
Standard length . . . . .	6 feet.	8 feet.	8 feet.	8 feet.	10 feet.	10 feet.
Weight of standard length . . . . .						
Price standard length . . . . .						
Price per foot, extra . . . . .						
Price extra head on rail . . . . .						
Price extra head on upright . . . . .						
Size counter pulleys . . . . .		14 x 4½ in.	16 x 5 in.	16 x 6 in.	16 x 6 in.	16 x 6 in.
Revolutions countershaft . . . . .		275 & 300	275 & 300	300 & 320	300 & 320	300 & 320

The countershafts above are fitted to run at two speeds with double set of pulleys and two pulleys of proper size to give above revolutions should be placed on main shaft.

*60 Inch Gleason Planer.*

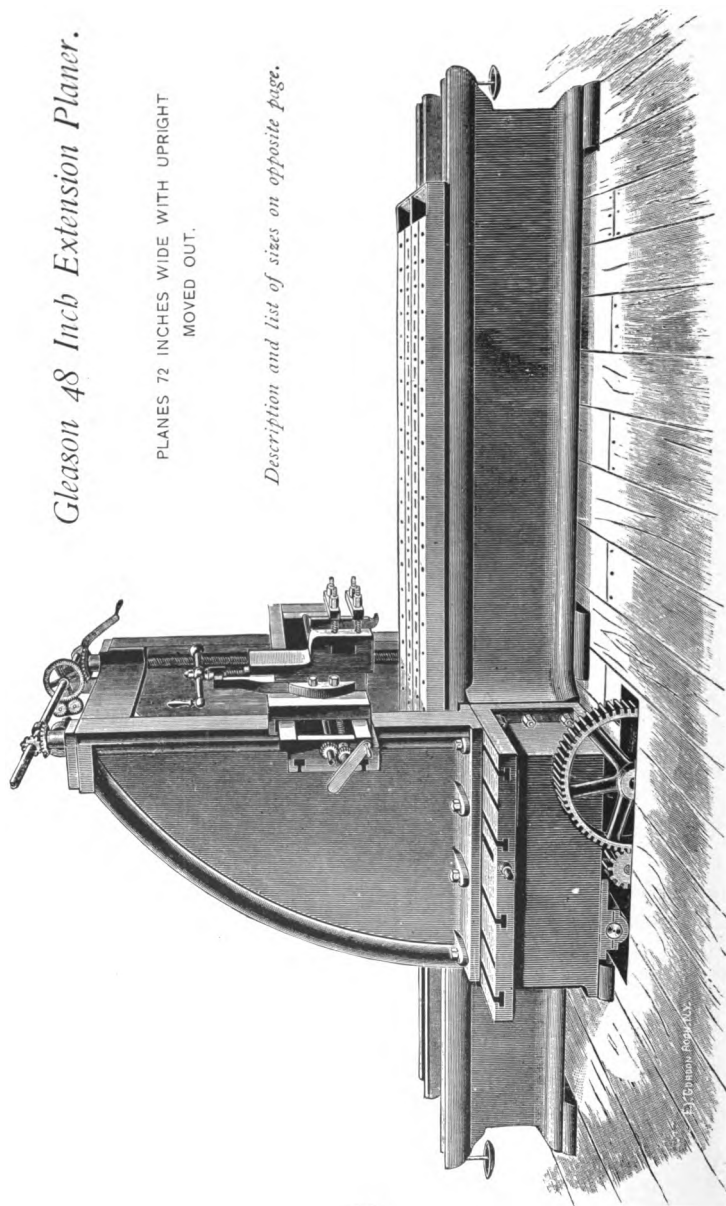


# Gleason Planers.

## DETAILS AND PRICES.

	60 Inch.	72 & 80 In.	72 Inch. Light.	72 Inch. Heavy.	84 Inch.	96 Inch.
Standard length . . . . .	12 feet.	12 feet.	12 feet.	12 feet.	12 feet.	12 feet.
Weight of standard length . . . . .						
Price standard length . . . . .						
Price per foot, extra . . . . .						
Price extra head on rail . . . . .						
Price extra head on upright . . . . .						
Size counter pulleys . . . . .	16 x 6 in.	16 x 6 in.	18 x 6 in.	18 x 6 in.	18 x 6 in.	18 x 6 in.
Revolutions countershaft . . . . .	320 & 340	320 & 340	350 & 380	350 & 380	360 & 400	400 & 420

The countershafts above are fitted to run at two speeds with double set of pulleys and two pulleys of proper size to give above revolutions should be placed on main shaft.



*Gleason 48 Inch Extension Planer.*

PLANES 72 INCHES WIDE WITH UPRIGHT  
MOVED OUT.

*Description and list of sizes on opposite page.*



### ***Gleason 48 Inch Extension Planer.***

---

**T**HIS Planer, represented by the cut on opposite page, has an adjustable upright that can be moved out so that the planer will take in seventy-two inches wide. It is about the same amount of labor to widen the planer as it would be to raise or lower the cross-head on the same size planer. The movable upright is fitted in slots, which are planed in the top of an extension cast on the side of the bed, and a screw moves the upright on the top of this extension. The cross-head is long, and admits of planing a piece the full width, without changing the tool. The cross-rail is telescopic, and is in every way as solid as if made in one piece. The advantage that is claimed for this planer is, that in many shops but a small portion of the work required is large; and while this planer works with all the convenience of an ordinary 48-inch, it has the advantage of being able to do the wider work when required. There are several of them in use, giving good satisfaction.

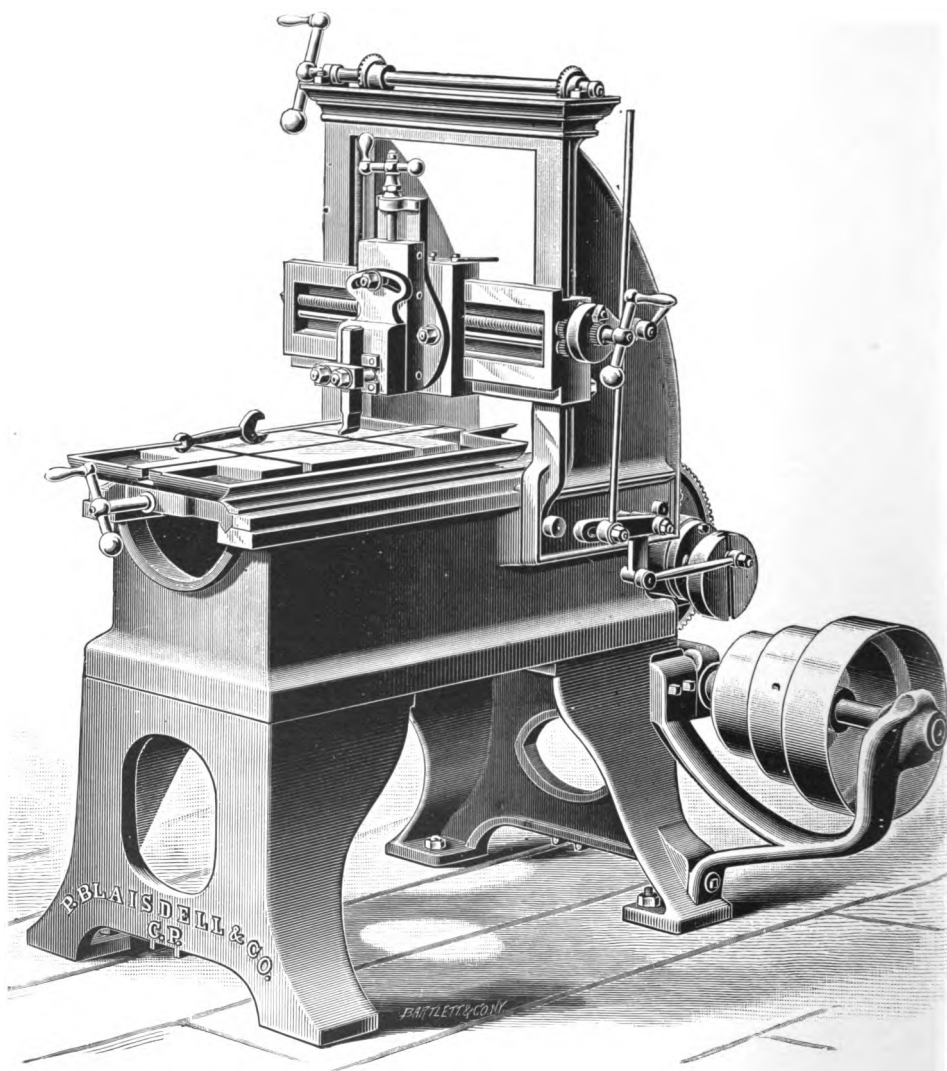
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#### **LIST OF SIZES.**

38-inch, extension to 56 inches wide; 42-inch, extension to 60 inches wide; 48-inch, extension to 72 inches wide.

*Prices on application.*

*Blaisdell Improved Crank Planer.*



*For price and description see opposite page.*

### ***Crank Planer.***

*Built by P. Blaisdell & Co.*

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**T**HE table on this machine gets its movement by a crank, similar to the crank on a shaping machine, instead of by a rack and pinion as on other planers. It runs much faster than an ordinary planing machine, and, having a quick return motion for the table, will do small work to much better advantage than a rack and gear planer.

The cross-head has power down, cross, and angular feeds.

The table is held in position by a gib which covers the tracks, thereby protecting them from dust and dirt.

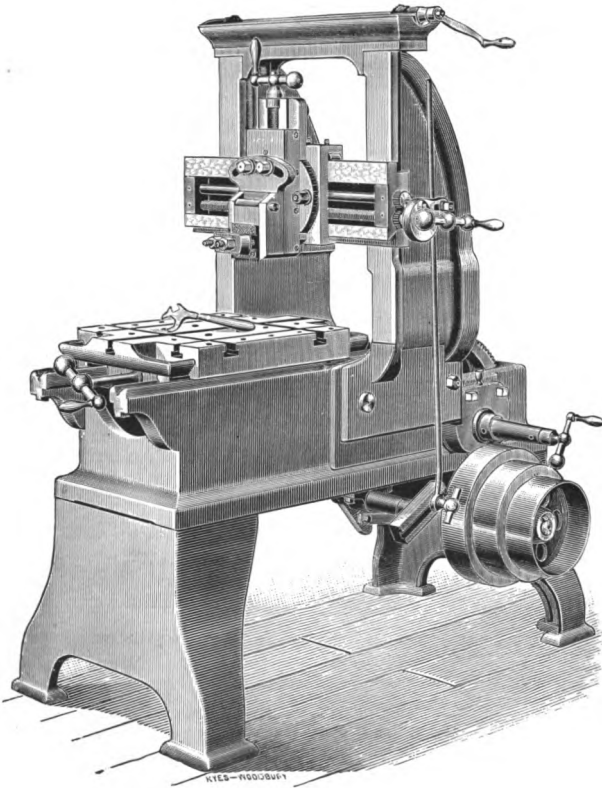
The driving cone has 3 speeds. Length of stroke, 15 inches. Will plane 18 inches wide and about 18 inches high. Weight, 1,800 pounds. Speed of countershaft, 150 revolutions per minute. Tight and loose pulleys, 14 inches diameter, 14 inches face.

---

Price, complete, with countershaft . . . . \$

## *Crank Planer.*

PLANES 17 INCHES WIDE, 17 INCHES HIGH. STROKE, 12 INCHES.



*Price and description of this machine on opposite page.*

### *New Patent Crank Planing Machine.*

---

**T**HIS is a machine fast becoming very popular with machinists and others who have much short planing to do, as it has an advantage of at least one-third over the common planer in its capacity for turning off work. It has the latest approved self-acting cross, angular, and vertical feed. It also has a quick return motion, giving to the cutting-stroke a movement nearly uniform, and is so constructed that the traverse of the table can be at will and with ease shortened or lengthened while the machine is in operation, which is a very desirable improvement in this kind of machine. It has also a new device for fastening the cross-head to the posts, being operated by the short movement of a lever.

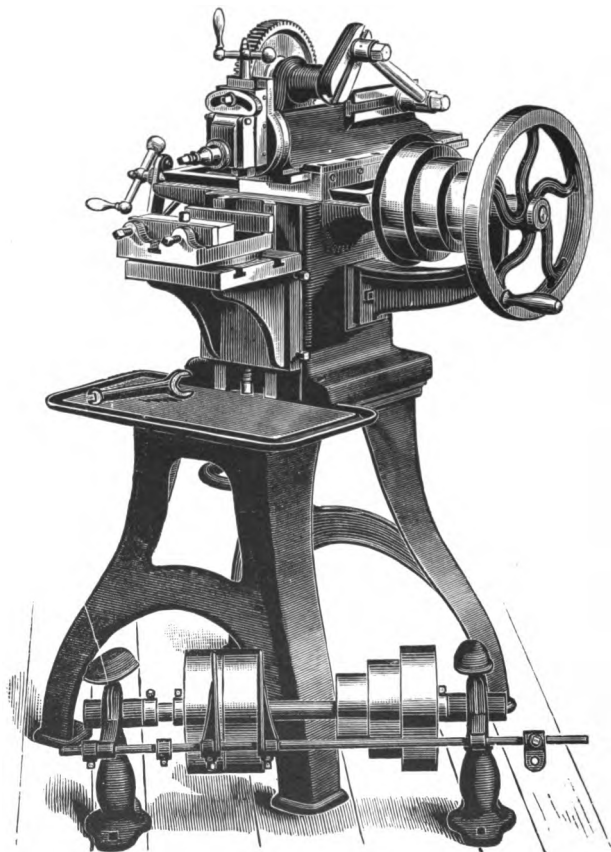
It planes between posts 17 inches wide and 17 inches high, and has a stroke of 12 inches, with a variable connecting-rod attachment to the table; so that the whole length of the table may be planed, which is 25 inches long.

**Weight, 2,000 pounds.**

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**Price, with countershaft . . . . . \$**

*6 Inch Traverse Head Shaper.*



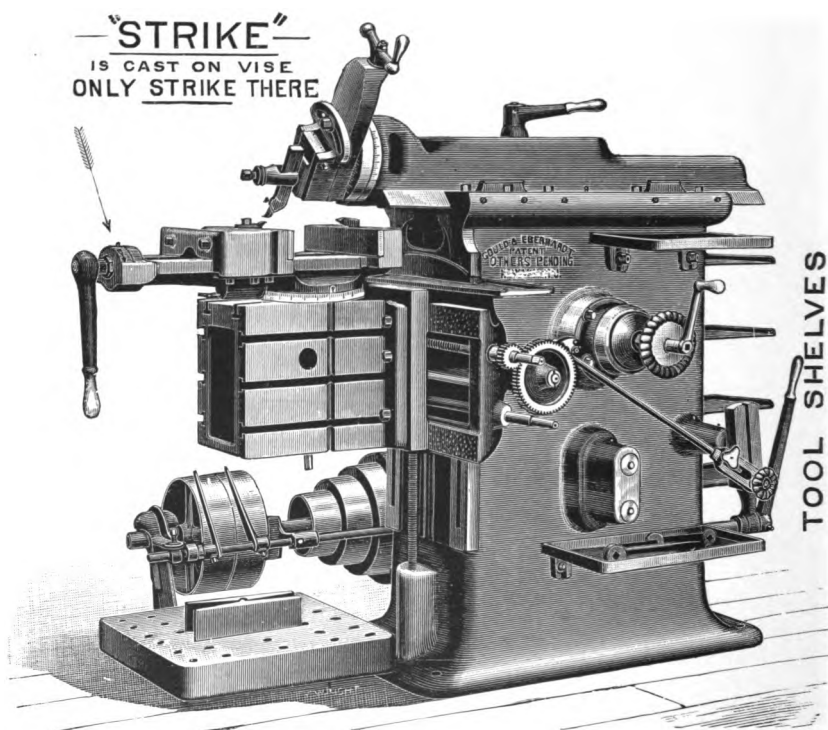
*For Dimensions and price see opposite page.*

***Hand and Power Shapers.****Made by Boynton & Plummer.*

**T**HESE are very convenient machines, capable of doing accurate work and for many purposes more desirable than more costly tools. Driving shaft and feed screws of best steel. Screws and other important parts case hardened. Feed automatic and reversible. Swivel chuck included in price. *See cut 6-inch opposite.*

	6 Inch.	8 Inch.	10 Inch.
Stroke . . . . .	6 inches.	8 inches.	10 inches.
Traverse . . . . .	6 “	8 “	8½ “
Vertical adjustment of table	5 “	7 “	7 “
Driving pulleys . . . .	6 x 2½ in.	8 x 2½ in.	10 x 2½ in.
Revolutions of counter . .	220	100	100
Weight . . . . .	350 lbs.	600 lbs.	775 lbs.
Price . . . . .			
“ centres . . . . .			

*Eberhardt's Patent Quick-Return Stroke Shaping Machine.*




**DOUBLE TRIPLE QUICK STROKE.**  
(TRADE MARK.)

*For price and description see opposite page.*



## *Quick Return Stroke Shaping Machines.*

*Made by E. Gould & Eberhardt.*

 **OPPOSITE** cut represents the 12, 16, 24, 26 and 30 inch stroke Patent Shapers. Work can be fastened as quickly as in the common vise, at any angle, or to plane any bevel; the vise jaws project outside to hold long or short work, to plane off the ends of punches, rods, etc. The vise is quickly replaced with a face plate by loosening one bolt; a pair of adjustable centres go on each vise for doing small work, such as fluting taps, reamers, etc. The vise may be fastened to the side of the angle plate for holding large and heavy work.

The tool bar is very strong and stiff, and is worked by a patent adjustable crank motion and slotted lever, which can be set instantly, to give any required stroke, while in motion or at rest.

The stroke on each machine is graduated, and a pointer indicates the length it planes.

Cross slide stops automatically at each end, and is self-feeding across or circular, controlled by a new catch. A patent automatic brake is attached to countershaft to stop quickly.

All have four-speed cones.

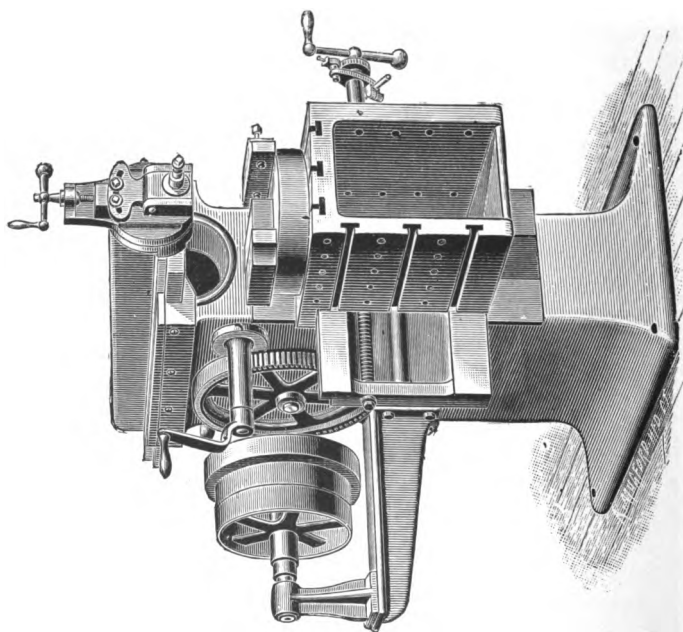
A face plane, countershaft, and wrenches are furnished with each machine.

Planes—Inches			Takes bet. Jaws.	Counter Pulleys.			Weight about.	Price.
Stroke.	Width.	Height from Angle.		Dia.	Face	Rev. min.		
12 in.	14 in.	9 in.	8 in.	9 in.	2 in.	130	1000	\$
16 "	17 "	14 "	10 "	12 "	3 "	180	1900	
20 "	20 "	17 "	12 "	12 "	3 "	180	2200	
24 "	24 "	18 "	14 "	12 "	3 "	200	2600	
26 "	28 "	24 "	14 "	14 "	3 "	220	3700	
32 "	35 "	26 "	16 "	16 "	4 "	220	6400	

16 in., 20 in., 24 in., 26 in., 32 in. are ("Double **Triple Quick Stroke.**")  
(Trade Mark.)

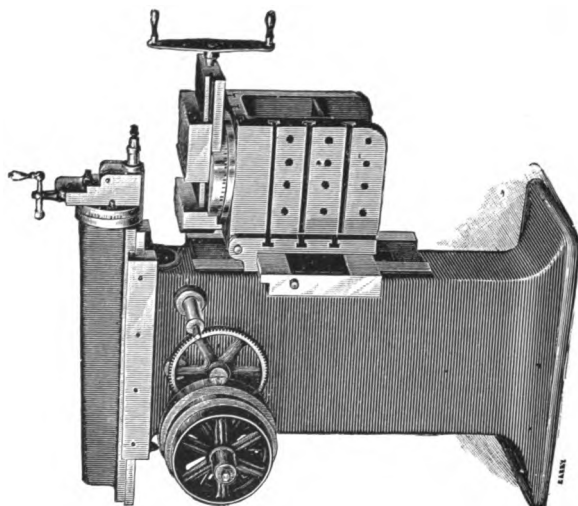
All wrought-iron work, bolts, nuts, wrenches, etc., are case-hardened.

*24 Inch Shaper.*



**This size is now made with down feed in head.**

*15 Inch Shaper.*



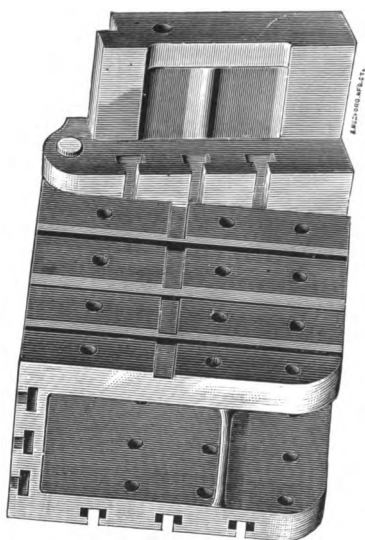
### *Rack Driven Friction Shapers.*

THESE Shapers are drawn by a reversing friction geared into a rack at the bottom of the cutter-bar. This gives equal speed and power through the whole stroke, a great advantage in accuracy of work, and also in the amount of work performed, as the number of strokes increase as the stroke shortens. This stroke can be changed without stopping the machine. Machines are very simple and reversing gear warranted to last as long as any part of the machine. A bar of iron can be passed under the cutter-bar for key-seating and other light work.

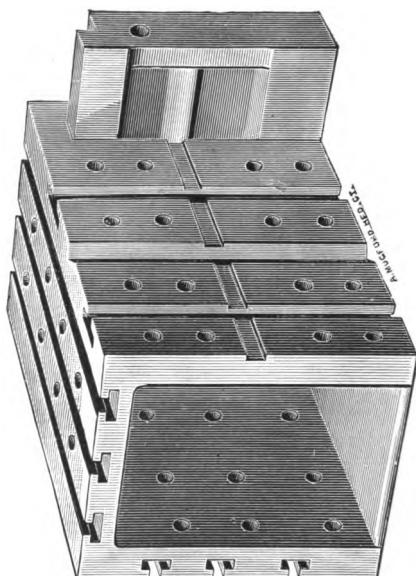
#### DETAILS AND PRICES.

Stroke . . . . .	15 inch	24 inch
Cross feed . . . . .	15 "	21 "
Height will take . . . . .	14 "	18 "
Weight . . . . .	1,100 lbs.	2,200 lbs.
Countershaft and pulleys . . . . .	8 x 2¼ in.	10 x 3 in.
Revolutions counter . . . . .	250	200
Price, with tipping table and improved vise		
Price, with fixed table and vise . . . . .		

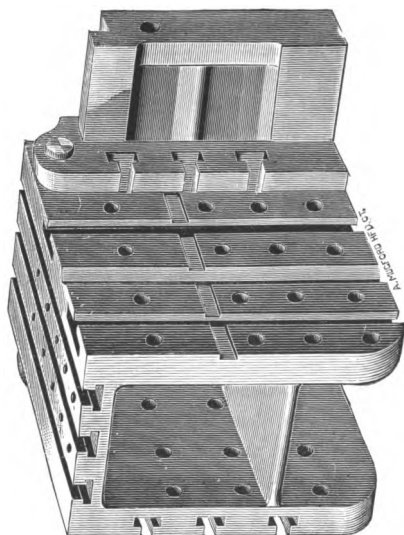
15-inch machine is commonly sold with tipping table and "improved" vise, 24-inch with fixed table and "old style" vise, as shown in cuts. We also supply a 25-inch machine of the same general style adapted to very heavy classes of work. Particulars on application.



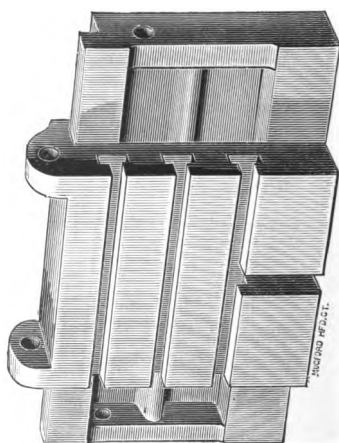
Adjustable Table set to plane on a Taper.



Solid or Non-Adjustable Table.



Adjustable Table set parallel with Cutter Bar.



Cross-head and Saddle, with Table removed

***Shaper Tables,  
For 15 and 24 Inch Shapers.***

---

THE cuts on opposite page show the different styles of table that can be furnished with the 15 and 24 inch Shaping Machines.

The cut on page 142 shows the 15-inch Shaper with an adjustable table, and the 24-inch Shaper with solid table.

The solid table is, of course, recommended where the greatest strength and rigidity are required. The adjustable table has, however, many advantages in its favor. It is very convenient for all kinds of taper work; and, as it can be entirely removed from the saddle, a heavy casting, such as the frame or leg for a machine, can be placed and fastened close to the column of the shaper, and the top planed off.

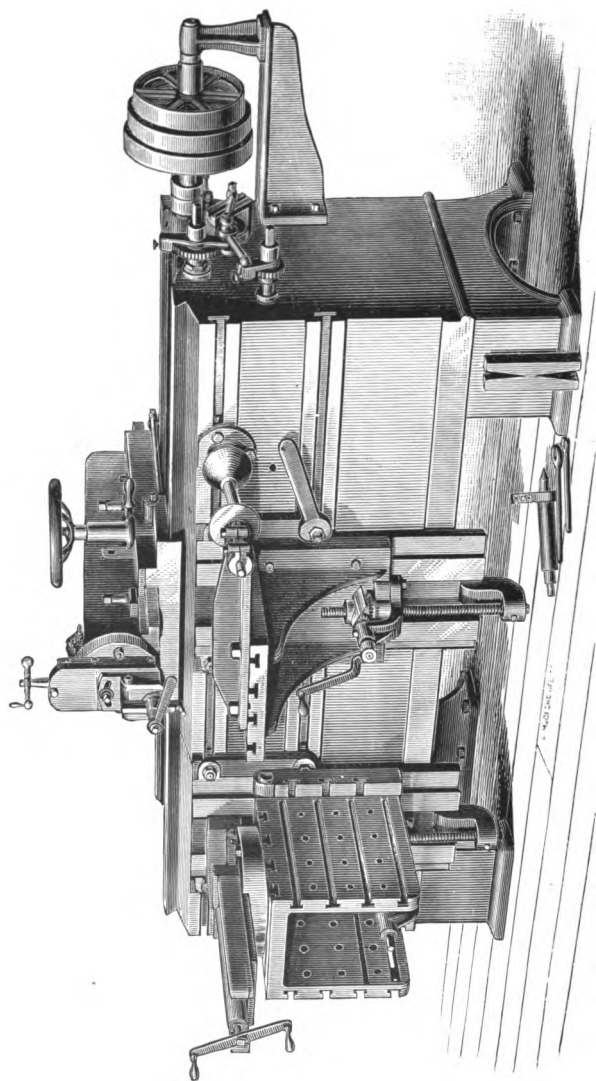
The table is adjusted by means of a screw, not shown in the cuts.

The 15-inch Shaper is furnished with either solid or adjustable table at the same price.

The adjustable table for the 24-inch Shaper costs \$25.00 extra.

It will be noticed, by referring to the cuts on opposite page, that work can be fastened to either side of the table as well as on the top.

*20 Inch Stroke Traverse Head Shaper.*



*Price and description of this machine on opposite page.*

## *20 Inch Stroke Traverse Head Shaper.*

---

**D**ESIGNED for very heavy work. It has a stroke of 20 inches, and the head has a traverse of 60 inches. It has automatic horizontal, vertical, and angular feed. The circular arbor has independent automatic feed, operated from pulley end of machine. The vise has extra jaws to hold taper work. It has two tables, one of them a patent adjustable table for planing taper work. This table is made square or box form, with bolt slots on each side and on top, so that work can be bolted on either side. The machine should stand on a solid foundation; and, if desired, we can provide heavy cross-beams on which to set the machine, and a heavy cast-iron floor table, with slots and holes like a planer table, to which to bolt work; from the top of this table to slide is 45 inches. The tables on machine can be run off easily, to make room for large work to be bolted to front of machine.

Speed of countershaft, 200 revolutions. Size of tight and loose pulleys on countershaft, 10 inches  $\times$  3 inches. Weight of machine, without foundation beams and plate, 6,700 pounds.

---

Price, complete . . . . . \$

---

### *Prices of other Sizes of Traverse Head Shapers.*

**15-inch Stroke.** — Saddle has 27 inches traverse, will plane a piece 14 inches high.

Weight, complete, 2,300 pounds.

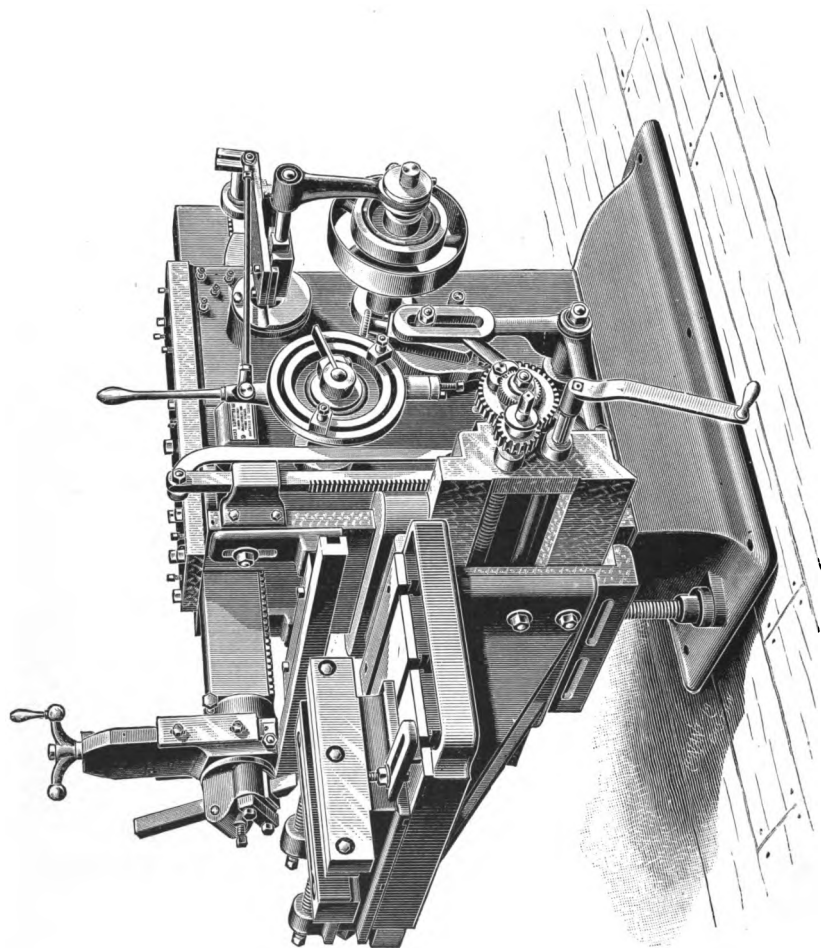
Price, with one table and vise . . . . . \$

**30-inch Stroke.** — Saddle has 72 inches traverse, will plane a piece on floor table 44 inches high.

Weight, complete, 10,000 pounds.

Price, with two tables and one vise . . . . . \$

*New Reversible Shaper.*





## ***Morton's New Reversible Universal Shaper.***

*Made by the Morton Manufacturing Co.*

**T**HE extraordinary power, great capacity and novel features of this Shaper make of it in effect a new machine.

It is a friction rack-feed Shaper, having the even cutting speed of that type. Stroke adjustable while running.

The ram of cast steel is square, having bearing all over it. On the under side between the two driving racks this is of phosphor-bronze. This form of ram gives the greatest strength and bearing. The ends of ram are bored true with the planing, and by removing the head a secondary ram can be placed within and revolved by hand wheel at the rear, for interior circular planing; or with index, internal gears can be cut.

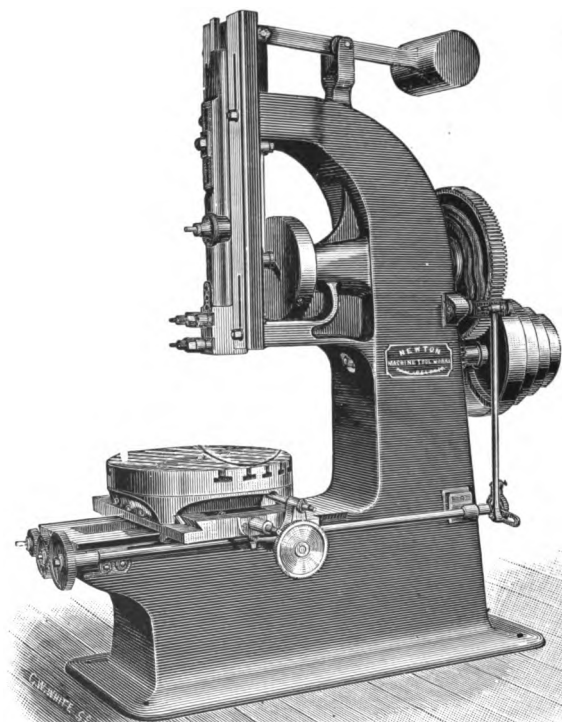
The work is naturally done with a pulling cut which gives vastly greater power, closes all joints in machine or in work while pulling, and gives a lifting, rather than a digging tendency to the tool. Machines can be reversed for pushing cut if required.

All adjustments for meeting strains and taking up wear are planned for the heaviest work. With the 36-inch stroke machine, cutting 28 inches, cuts were taken in cast iron 2 inches deep,  $\frac{1}{8}$  inch feed. With 24-inch machines wrought iron  $2\frac{1}{4}$  inches wide and 24 inches long was reduced  $1\frac{3}{4}$  inches in two cuts. Machines are made from 14 to 72-inch stroke. The larger ones have over-reaching supporting arms. These machines are specially adapted to heavy engineering work. Lever track and carriage for moving large and heavy work in front of machine supplied in place of table if preferred.

---

*Prices on application.*

*Slotting Machine.*



### *Newton's Slotting Machines.*

THESE machines are provided with Whitworth's quick return. Cutting bars and slides are adjustable. Feed is at the top of the stroke. Self-feeding in all directions, and circular table has full bearing on upper slide carriage.

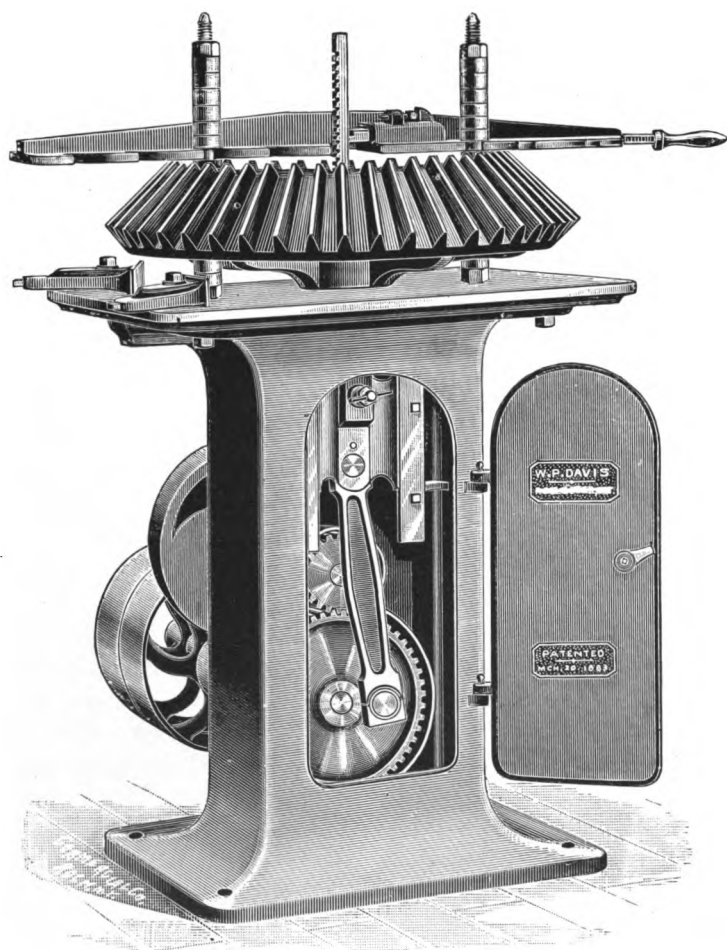
STROKE . . . . .	6	8	10	12	14	16	18
Cuts to centre of . . .	23 in.	28 in.	38 in.	48 in.	54 in.	66 in.	71 in.
Counter pulleys . . .	14 x 4	14 x 4 $\frac{1}{2}$	18 x 4	20 x 4	20 x 4	28 x 5	30 x 5 $\frac{1}{2}$
Speed counter . . . .	150	160	160	165	170	180	180

### *20 Inch, 25 Inch, 30 Inch Slotting Machines.*

WHERE work for a slotter requires stroke of over 18 inches we believe a rack feed will prove much more satisfactory than a crank. We offer such machines with *rack and spiral pinion*, driven by angular bevel gearing, giving a very even stroke and great power, belt velocity 110 to 1. Bed extended, allowing carriage to be moved well back from cutting bar.

*Special circulars on application*

*Davis No. 1 Key Seating Machine.*



***Davis' No. 1 Key Seater and Slotting Machine.*****PATENTED.**

**T**HIS machine has capacity for cutting key-seats from  $\frac{1}{4}$  to 1 inch, and works very fast. We call particular attention to the general design; the frame and ways being one solid casting, therefore are very strong, and cannot possibly get out of line. The gears are  $1\frac{5}{8}$  inches face, cut from the solid, and protected from dirt and chips by a casing, which is not shown in cut. The bearings of connecting-rod are also protected from dirt and chips. The clamp which holds the work is adjustable to any desired height by means of washers on the stud-pins, and will not drop down. A very simple device regulates the draught and depth of cut, so that any number of key-seats may be cut exactly alike, and tapering either way, the depth being regulated by screws in chuck blocks to any taper desired, which is a very desirable point.

The driving pulleys are 13 inches in diameter,  $4\frac{1}{2}$  inches face, and should make 350 revolutions per minute.

Two cutters, one  $\frac{3}{8}$  and one  $\frac{1}{2}$  inch, are furnished with each machine.

**Weight, 800 pounds.**

**Price . . . . . \$**

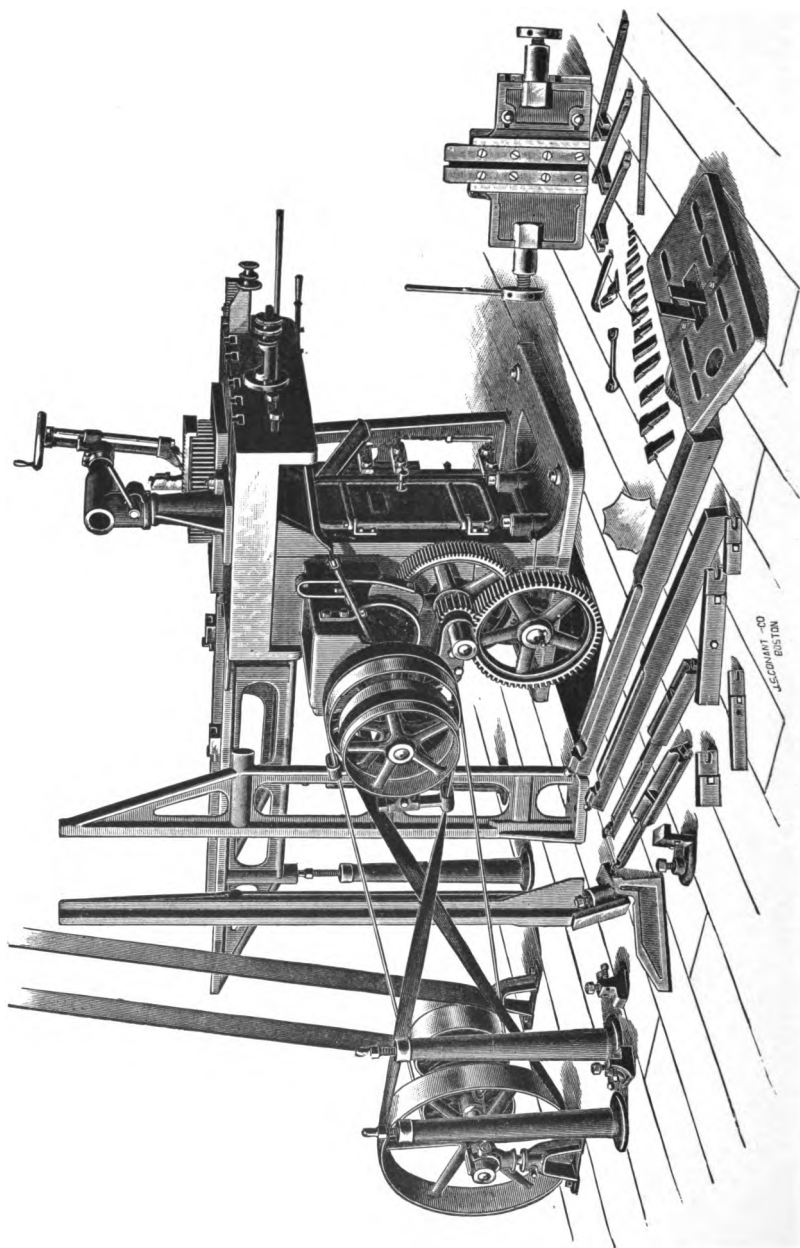
**PRICES OF CUTTERS.**

$\frac{1}{4}$ inch . . . . . \$	$\frac{5}{8}$ inch . . . . . \$
$\frac{1}{2}$ inch . . . . .	$1\frac{1}{8}$ inch . . . . .
$\frac{3}{8}$ inch . . . . .	$\frac{3}{4}$ inch . . . . .
$1\frac{1}{8}$ inch . . . . .	$1\frac{3}{8}$ inch . . . . .
$\frac{1}{2}$ inch . . . . .	$\frac{7}{8}$ inch . . . . .
$1\frac{3}{8}$ inch . . . . .	1 inch . . . . .

No. 2 Key-seating Machine is the same design as No. 1, except that it is not geared. It cuts from  $\frac{1}{16}$  to  $\frac{5}{8}$ .

**Price . . . . . \$**

*Morton Key-Way Cutter No. 6.*



*Morton Key-Way Cutters.*

**T**HESE machines have established the highest reputation for the amount and quality of work produced.

With them are supplied necessary extension arms for support of large work, full sets of cutters, backings, leveling blocks, bevels for grinding cutters, gauges for setting improved adjustable centering top plate or chuck with micrometer gauge for measuring depth of key-way, also push bars and countershafts.

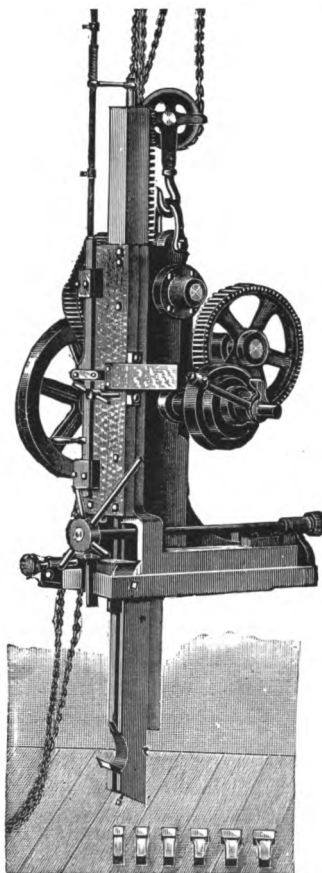
Key-making attachments are supplied as an extra, and have four backings, angle plate to relieve cutter bar of side thrust, steady bar and extra push bar.

The work binder shown on table in cut opposite is a late addition, greatly increasing the amount of work done.

**DETAILS AND PRICES.**

	No. 2.	No. 4.	No. 6.
Stroke . . . . .	11 inch.	18 inch.	24 inch.
Cutters . . . . .	$\frac{1}{4}$ to 1 inch.	$\frac{1}{4}$ to $1\frac{1}{4}$ in.	$\frac{1}{4}$ to 2 inch.
Counter pulleys . . . .	18 inch.	$12 \times 4\frac{1}{2}$ in.	$12 \times 4\frac{1}{2}$ in.
Revolutions . . . . .	125	175	175
Weight . . . . .	1,400 lbs.	2,800 lbs.	5,200 lbs.
Price . . . . .			
" key-maker . . . .			
" work binder . . .			

*Morton Portable Key-Way Cutter.*





### *The Morton Portable Key-Way Cutter.*

THE above cut represents our 36-inch stroke Portable Key-way Cutter, which is adapted to do work that is not practical to move onto a stationary machine as the work can be placed on the floor or boring mill or out doors in the yard. The machine is placed on the hub and the bottom of the machine comprises a three jawed chuck, two of the jaws being stationary and one traveling with screw and rod to rear of machine, and by turning up nut the machine is fastened almost instantly to hub. The cutter cuts on its upward stroke, so as it pulls the more the machine will hug the work. Key-ways, 3 inches wide and  $1\frac{1}{2}$  inches deep and 35 inches through hub having been cut with this machine in thirty-seven minutes, including time of attaching the machine. This machine has filled a long felt want in handling large work. Machines are supplied that will cut a key-way through a 6-foot hub and 6 inches wide.

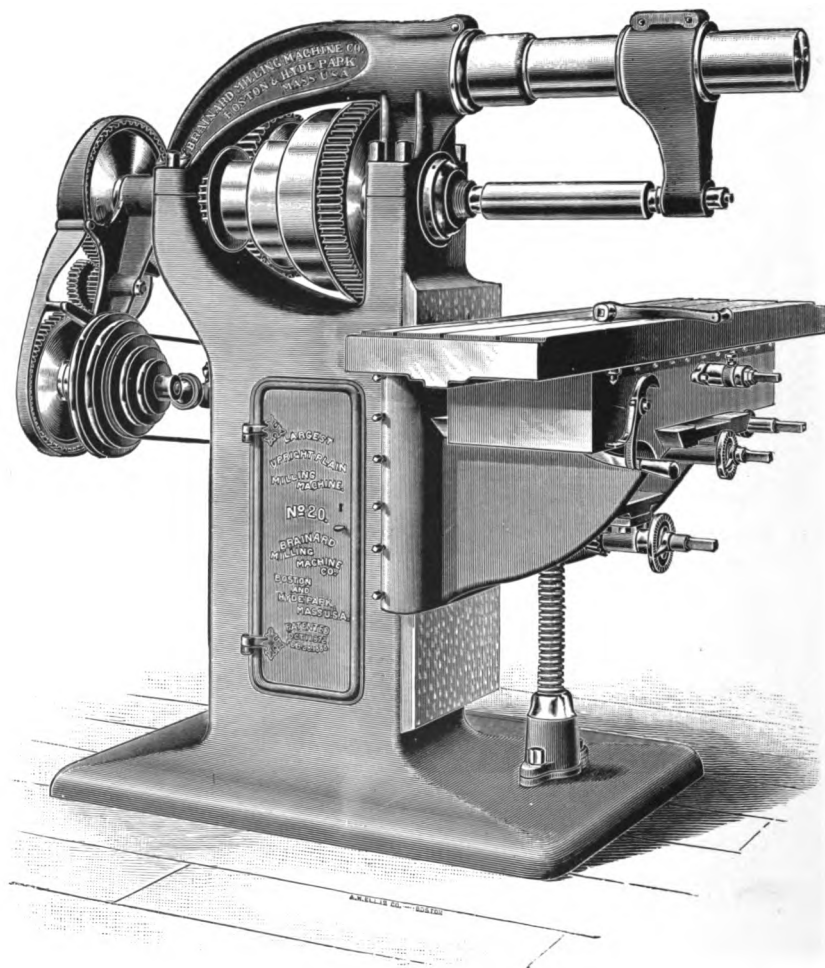
We are now furnishing a special improved Rope Transmission Hanger for driving these Portable machines.

A light 16-inch Portable Key-way Cutter is made on the same principles, which will cut from  $\frac{3}{4}$  to 2 inches wide and 18 inches long. Weight about 400 pounds. Makers guarantee to place in position cut Key-way and remove the machine in ten minutes.

---

*Prices on application.*

## *Upright Plain Milling Machine, No. 20.*



This is the largest Upright Milling Machine we build, and probably the most powerful built anywhere.

*For description and details see page 171.*

### *Brainard Milling Machines.*

**T**HE workmanship of these tools is of the highest possible character, and every effort is made to conform to the latest advances in the art of milling. Tools of greater capacity and power are being constantly brought out, as the principle is applied to new and heavier classes of work.

These machines may be divided into two general types, the *up-right* and the *horizontal*.

**UPRIGHT MILLING MACHINES** are of three classes :

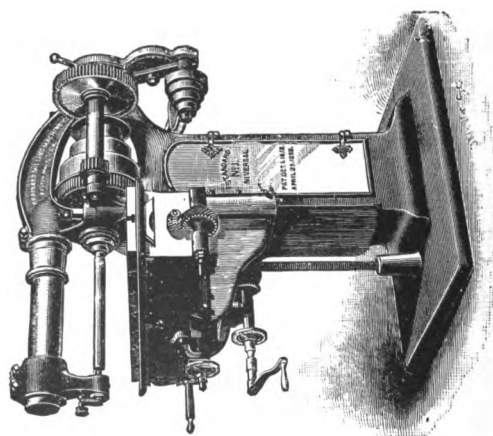
**THE STANDARD** for general use.

**THE UNIVERSAL** for tool rooms and automatic spiral cutting, and for work to be done on centres.

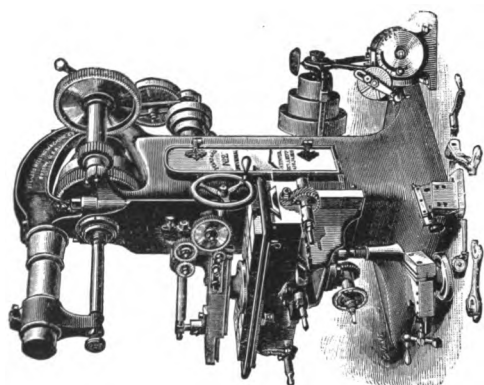
**THE PLAIN** for manufacturing purposes, table and vise work. These machines are described in the following pages, as are the various fixtures used with them and which make them complete.

**THE HORIZONTAL MACHINES** are largely special, adapted to various surfacing and grooving operations.

*Brainard's Standard Universal Milling Machines.*



No. 1 Universal Milling Machine.



No. 2 Universal Milling Machine.

### ***Brainard Standard Universal Milling Machines.***

**T**HESE are the machines best suited to general use in their six sizes. With the help of the various attachments supplied, and which fit all sizes unless otherwise stated, everything possible with a milling machine can be done.

The attachments commonly used are described in the following pages. They are :

**THE VISE**, either flat or rotary.

**THE DIVIDING HEAD AND CENTRES**, which are of different styles and sizes, including the 16-inch gear cutting device.

**THE SPIRAL CUTTING ATTACHMENT**, which may be either hand or automatic.

With these may also be had

**THE CAM CUTTING ATTACHMENT.**

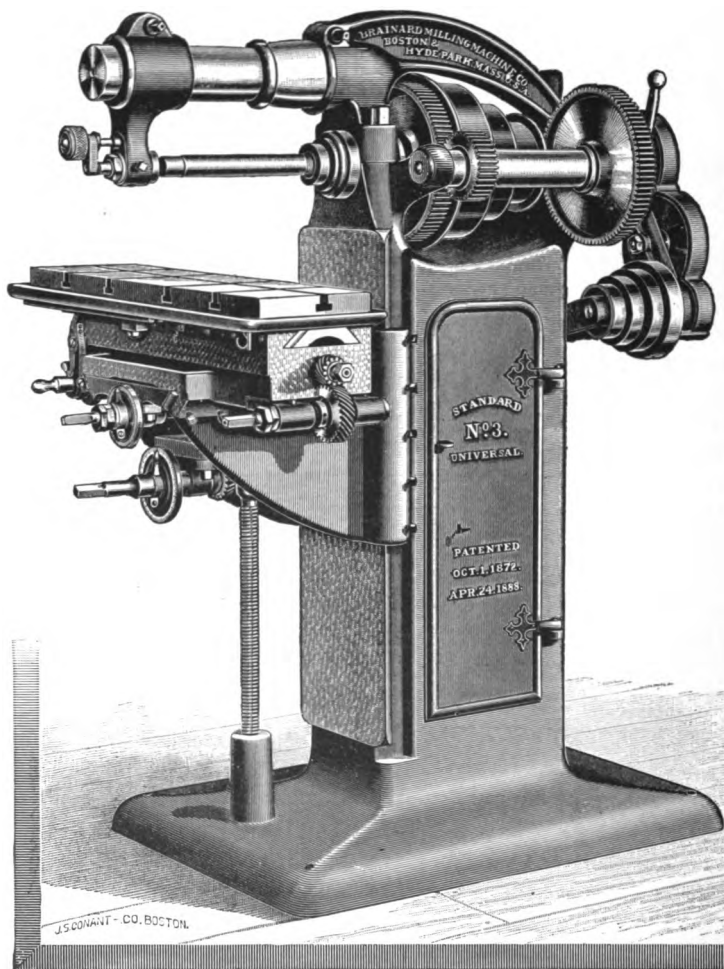
**THE RACK CUTTING ATTACHMENT.**

**THE ROTARY CHUCK**, for milling circular surfaces.

**THE VERTICAL SPINDLE ATTACHMENT.**—To this last special attention is called, as it is probable that in the near future it will prove one of the most valuable features of the milling machine.

The dimensions and weights given, page 165, will give a good notion of the comparative *power*, of the different sizes of these machines.

## *No. 3 Milling Machine with Universal Feeds.*



We have for years been experimenting with feeds in all directions, and can now furnish this machine with automatic feed, not only longitudinally, backward and forward, but vertically and also in line with the spindle. These feeds do not in any way interfere with each other and are all thrown out automatically at any point.

Two or more feeds can be run in combination.

Other sizes can now be fitted with these feeds.

Further particulars and photographs on application.

***Brainard's***  
***No. 3 Standard Universal Milling Machine.***

---

**F**OR illustration of the Standard machines we offer on this page a description of the No. 3, the great demand for which makes it a typical machine of this class.

For a really "universal" milling machine, this size is perhaps the most desirable; its weight, capacity, and power being sufficient for general and quite heavy work, while it is not too large to be easily and quickly handled and rapidly run. It is admirably adapted for all kinds of work, plain or universal. It will carry mills up to 8 inches diameter, and can yet be used for the smallest and most delicate mills. It will mill 13 inches from face of machine. It has six changes of speed for a 2½-inch driving belt, with four changes of feed, and is full back geared.

The work table has an automatic feed horizontally under the spindle of 22 inches, a vertical adjustment of 18 inches, which can be graduated to thousandths of an inch by a dial with adjustable finger.

The cross motion in line with spindle is 5 inches. The table is T-slotted, with one slot its whole length and five cross slots, all milled to a standard gauge, exactly parallel to, and square with, face of machine.

The machine has a strong removable arm for supporting outside centre of mill arbor.

The feed worm and feed gear are of hardened tool steel, feed screw of steel, all gib, set, and cap screws of steel or Norway iron, case-hardened. It has compensating feed nut, and the bearings of spindle are also compensating. The spindle is large, and is made from an extra grade of steel; it has a  $\frac{9}{16}$  inch hole through its whole length, and a screw upon its front end, which is the same as upon universal head, and spiral cutting attachment, so that a chuck fitting one will fit all.

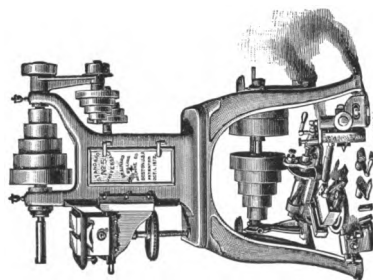
It has dust cap to front bearing of spindle, feed belt tension, and all improvements to be found in any of the other sizes. The workmanship is the best that is possible to put into a machine.

---

*Send for special Brainard catalogue describing this and larger sizes,  
Nos. 1 and 2.*

## No. 5 Standard Universal Milling Machine.

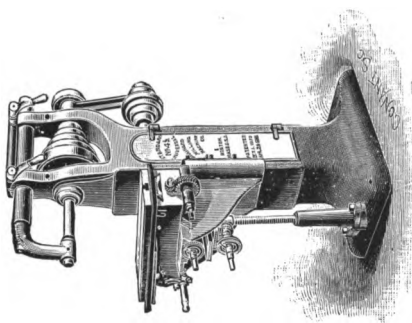
COMPLETE.



This Machine is intended for manufacturers of Electrical Machinery, Brass Finishers, and for other light and small work. It has, however, all the movements and conveniences of the larger "UNIVERSAL" Machines, including a complete set of Attachments, as shown in cut, viz : Universal Centres, Spiral Cutter, and Rotary Vise ; also a *Hand Attachment* made specially for this size and No. 4½ machine. The Elevating Wheel is graduated to thousandths of an inch. It has all the nicety of finish found in the larger sizes. The spindle runs in compensating bronze bearings, provided with dust cap, etc.

## No. 4½ Standard Universal Milling Machine.

With New Patent Quick Return Movement.



This size machine is somewhat peculiar, being intended for light, rapid working, yet of considerable range. The proper Attachments are those used on No. 5 machine, but it will take those intended for the larger sizes. The slot in work table is of the same width as in the larger sizes, making it a remarkably convenient machine to use in connection with the larger sizes, either in the tool room or elsewhere. A large elevating wheel, graduated to thousandths of an inch gives the necessary accuracy in setting work table. Originally made for a special purpose, it has proved a popular size. The overhanging arm, shown in this cut, is an extra, only added if specially ordered.



# Brainard's Standard Universal Milling Machines.

## LIST OF SIZES, DETAILS, AND PRICES.

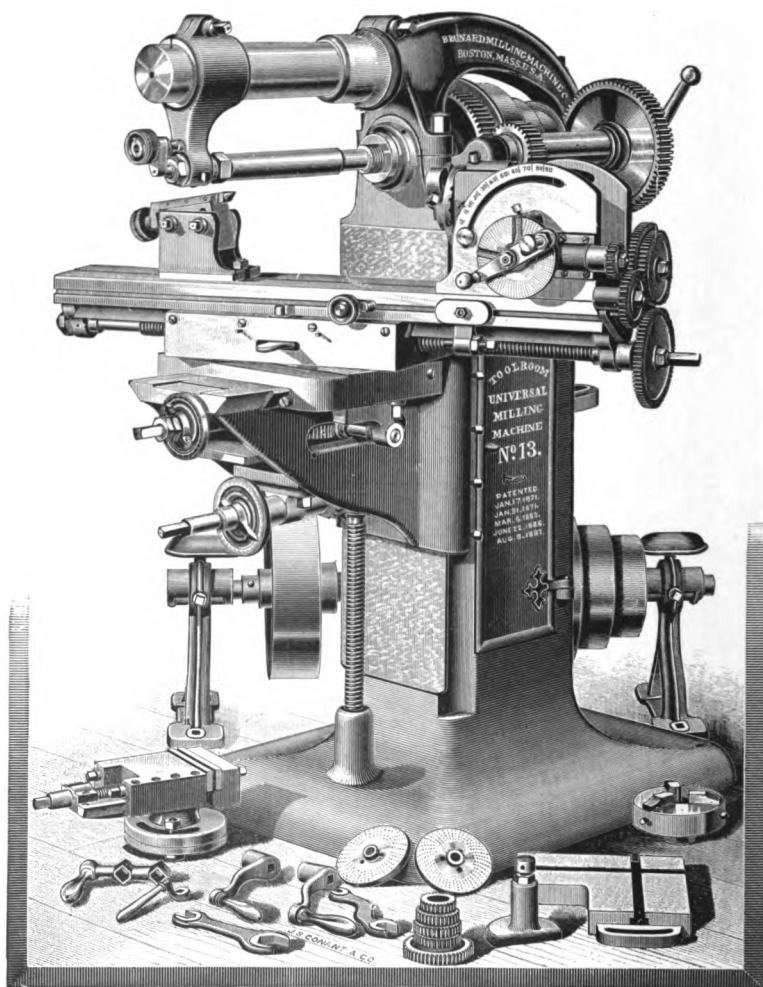
	No. 1.	No. 2.	No. 3.	No. 4.	No. 4½.	No. 5.
Automatic longitudinal feed . . . . .	36 in.	26 in.	22 in.	18 in.	12 in.	9 in.
Vertical range below spindle . . . . .	24 "	21 "	18 "	16 "	15 "	7 "
Cross motion in line with spindle . . . . .	10 "	8½ "	6½ "	5 "	5 "	3 "
Number of speeds for driving belt . . . . .	6	6	6	5	5	5
Width of driving belt . . . . .	4 in.	3½ in.	2¾ in.	3½ in.	2 in.	2 in.
Number of changes for feed . . . . .	4	4	4	4	4	4
Size of cutter that can be used under arm . . . . .	12 in.	10 in.	8 in.	8 in.	No arm.	No arm.
Will mill out from column . . . . .	18 "	16 "	13 "	12 "	No arm.	No arm.
Weight, complete, boxed for shipment . . . . .	4,800 lbs.	3,500 lbs.	2,350 lbs.	2,000 lbs.	1,200 lbs.	900 lbs.
Price, with countershaft, no attachments . . . . .						
Price, complete, with regular attachments . . . . .						
Speed of countershaft . . . . .	100 rev.	120 rev.	120 rev.	120 rev.	130 rev.	130 rev.
Diameter tight and loose pulleys . . . . .	18 in.	16 in.	14 in.	14 in.	12 in.	10 in.
Width tight and loose pulleys . . . . .	4½ "	4 "	3½ "	3½ "	2½ "	2½ "

Nos. 1, 2, and 3 are the only sizes made with Back Gears. Nos. 1, 2, 3, and 4 have the overhanging arm to support outer end of cutter arbor. Nos. 4½ and 5 do not have this arm.

except as it is added to No. 4½ as an extra.

*Prices of attachments on pages 173-183.*

*Brainard's No. 13*  
*Tool-Room Universal Milling Machine.*



**Brainard's New**  
**"Tool Room" Universal Milling Machine.**

*(See engraving on opposite page.)*

---

THIS machine is designed with special reference to tool-room purposes, for spiral cutting and for work to be done in centres, and is most conveniently arranged for every variety of work incident to the tool-room, as making Milling Cutters of every kind, cutting Twist Drills, fluting Taps and Reamers, Cam Cutting, Die Sinking, Nut and Bolt head finishing, cutting of Spur, Bevel and Worm Wheels, etc. It *cuts Spirals automatically*, both right and left hand the full length of machine feed, and of all required pitches and divisions.

The work table swivels in both directions to  $45^{\circ}$ , and the feed work being centrally driven, is not affected by the position of the table, which also *feeds backward or forward* as required, without changing the direction of driving belt or feed belt,

The swivel carriage rotates on a central bearing, and when adjusted is bolted to the lower half which traverses the knee, thus avoiding the usual weak central joint held only by a single set screw.

All sizes except No. 15 are provided with Brainard's patent COMBINATION HEAD, in which two independent systems of dividing are combined; this with the patent tilting Back Centre make incomparably the most perfect and convenient dividing centres ever used on a milling machine. See page 175.

Each size has a large overhanging Arm for outside centre support, with Brainard's plan for quick removal.

Five sizes are made, viz.: Nos. 11, 12, 13, 14 and 15. The cut on opposite page shows No. 13. There are two smaller and two larger sizes.

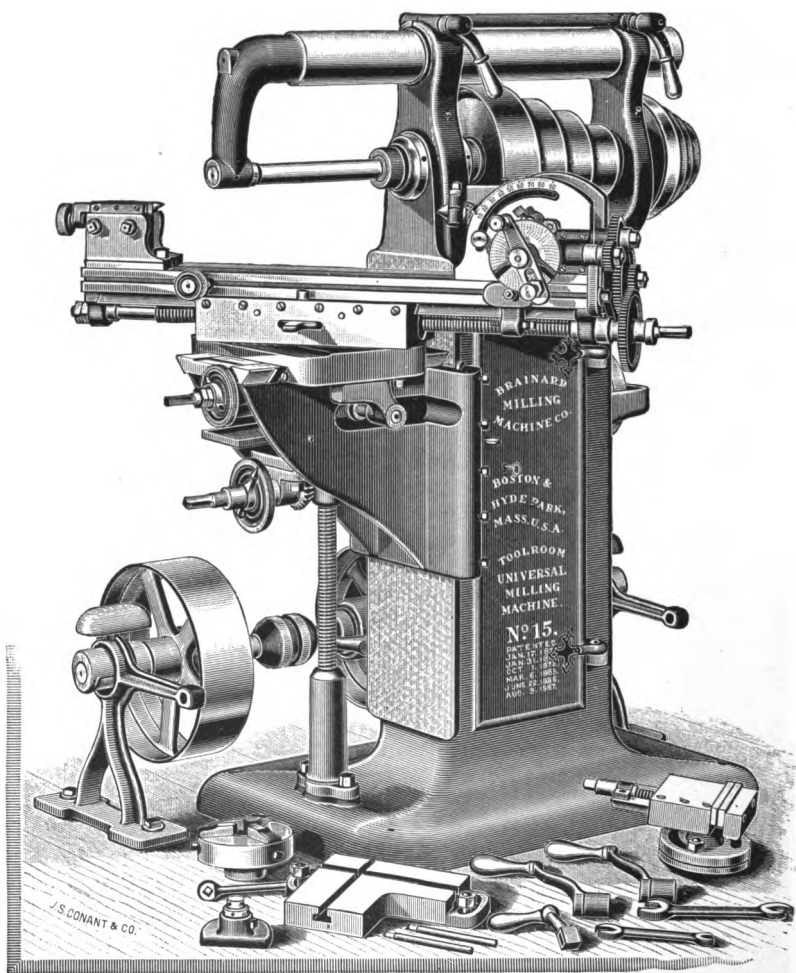
The price includes everything shown in cut.

The chuck fits the main spindle of machine, as well as the head spindle, except in the case of the two largest sizes.

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*For details see next page.*

*Brainard Tool Room Milling Machine No. 15.*



# Brainard's New Tool-Room Universal Milling Machines.

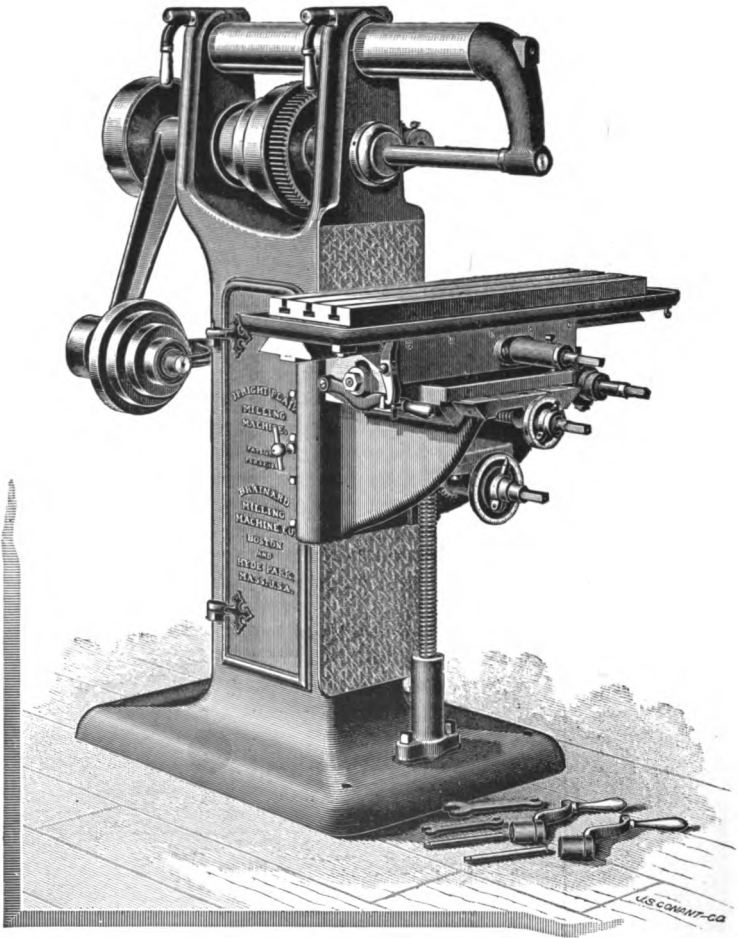
## LIST OF SIZES, DETAILS AND PRICES.

	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.
Weight, complete, ready for shipment . . . . .	4,800 lbs.	3,800 lbs.	2,200 lbs.	1 900 lbs.	1,750 lbs.
Automatic or longitudinal feed . . . . .	42 in.	27 in.	20 in.	20 in.	18 in.
Vertical range below spindle . . . . .	24 "	21 "	20 "	18 "	16 "
Cross motion in line with spindle . . . . .	9 "	8 "	7 "	7 "	6 "
Centres will swing . . . . .	12½ "	12½ "	10¼ "	10¼ "	8¼ "
Centres will take in length . . . . .	44 "	26 "	21 "	20 "	18 "
Number of speeds for driving belt . . . . .	6 or 12	6 or 12	6 or 12	4 or 8	4 or 8
Width of driving belt . . . . .	4 in.	3½ in.	2¼ in.	3½ in.	3 in.
Changes of feed . . . . .	4	4	4	4	4
Size of cutter that can be used under arm . . . . .	12 in.	10 in.	8 in.	8 in.	8 in.
Price, complete, with all attachments . . . . .	120 & 102	130 & 111	120 & 102	120 & 102	130 & 111
Speed of countershaft . . . . .	14 & 16 in	12 & 14 in.	12 & 14 in.	12 & 14 in.	12 & 14 in.
Diameter friction pulleys . . . . .	4¼ in.	4¼ in.	3½ in.	4 in.	3½ in.
Face of friction pulleys . . . . .					

General description of all sizes same as that of No. 13 on page 167. Nos. 11, 12, and 13 have Back Gears.  
All sizes have the overhanging arm to support cutter arbor. If this arm is not wanted, deduct \$

## *Upright Plain Milling Machine.*

SCREW FEED, RACK AND PINION RETURN.



Upright Plain Milling Machines are at present made in five sizes. Weights given in data on opposite page will afford a good idea of the comparative power of these machines. The No. 22 about corresponds in power with the No. 2 Standard. The No. 20 is perhaps the most powerful machine of the kind made. See cut page 153.

**Brainard's Upright Plain Milling Machines.**

**T**HESE tools, on account of their quickness of movement and ease of change, are specially adapted to the ordinary processes of manufacture, and particularly to work done on the table or in the vise.

They are suited to the same classes of work as the horizontal machines described on following pages, but have the advantage of much greater depths under the spindle.

The automatic feed is by a worm running in a rack, the teeth of which are worked out to exactly fit the worm. A spiral pinion, connected with a crank shaft, also engages the rack, and runs as an idler when the machine is feeding automatically. When the automatic feed is tripped *the worm drops clear of the rack*, and the table is run back by means of the spiral pinion direct, at the rate of 3 inches for each turn of the crank. This combination of *screw feed, and rack and pinion return*, is perfect, giving the advantages of both kinds of feed without the disadvantages of either.

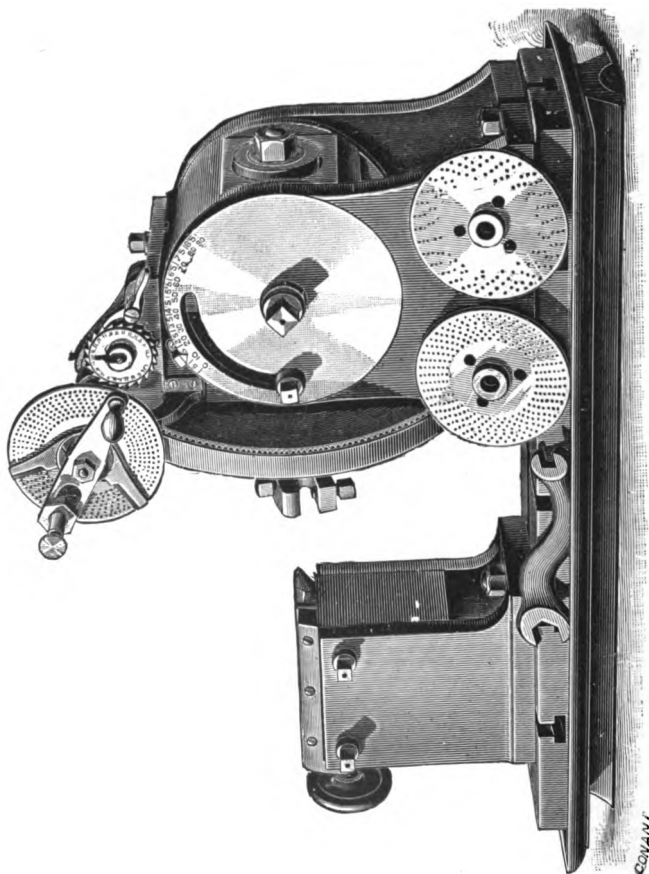
The bearings of work-table in carriage are long, and the length of feed is limited only by the length of table.

All the attachments used on the Standard Universal Milling Machines can be used on this style.

	No. 20.	No. 21.	No. 22.	No. 24.
Weight, boxed for shipment . . . .	8,000 lbs.	5,800 lbs.	3,400 lbs.	1,800 lbs.
Length of table, exclusive of oil pan .	78 in.	66 in.	48 in.	30 in.
Width of table . . . . .	16 "	16 "	15 "	8 "
Automatic longitudinal feed . . . . .	72 "	66 "	48 "	30 "
Cross motion in line with spindle . .	14 "	11½ "	7 "	5 "
Vertical range . . . . .	25 "	23 "	21 "	20 "
Length of table bearings in carriage .	60 "	48 "	34 "	17½ "
Width of driving belt . . . . .	4½ "	4 "	3½ "	2½ "
Changes of speed . . . . .	6 or 12	6 or 12	6 or 12	6 or 12
Changes of feed for each speed . . .	10	10	8	4

No. 25 is also made and is same as No. 24, except it is without back gear.

*Brainard's New Gear Cutting Device.*



*Price and description of this device on opposite page.*



## *Attachments for Brainard Milling Machines.*

**W**E illustrate on these and following pages the attachments we supply with these machines. They will fit any of the upright machines of either type, unless otherwise stated.

### *Brainard's New Gear Cutting Device.*

**C**AN be used on Nos. 1, 2, 3 and 4 Standard Universal Milling Machines.

The worm wheel is nearly 12 inches in diameter, and is mechanically perfect. This tool has cut the finest lines upon the edges of two cast-iron disks, placed in contact, that the metal would bear; and these lines, under a microscope, were found to coincide exactly, in any position of the disks,—a test, it is believed, that few, if any, of the largest and most expensive gear cutters would bear.

The provisions for obviating all slack motion are original, and very perfect. The worm shaft runs in compensating bearings, the steel worm has fine adjustments, the tool is capable of making divisions as fine as one minute of an arc, or dividing the circle accurately into 21,600 parts.

The danger of mistakes in counting revolutions of the worm, which has heretofore been a drawback in the use of worms and worm wheels, for gear cutting, is avoided in this tool by means of a self-registering dial, which automatically registers each revolution of the worm. Upon touching a thumb lever, the dial returns at once to zero.

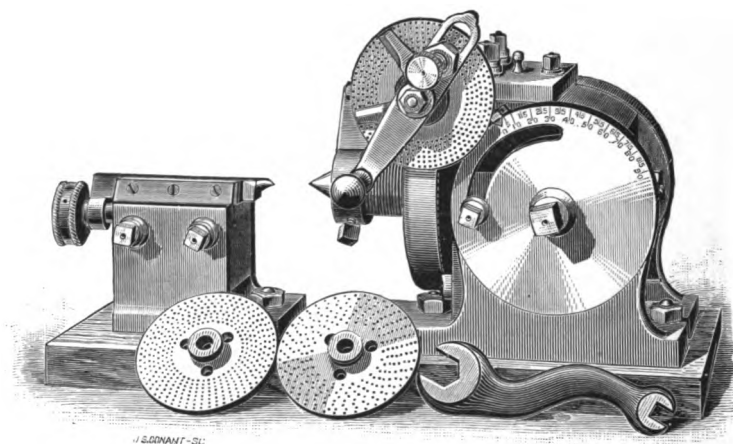
Three dials drilled in 23 circles make, in combination with the worm wheel, all divisions to 90, all even divisions to 180, with most of the other divisions below that number, or 135 divisions; also multiples of these numbers to 16,200. The dials are interchangeable, and additional dials to make any other required divisions can be furnished at trifling cost.

From the fact that work can be supported upon or between two centres, that the tool is heavy and strong, and is without slack motion, gear wheels can be cut with unusual smoothness as well as accuracy, and a number of gears can be cut at the same time.

The automatic feed of the machine can be used for cutting. Our patent back centre is included in price of this attachment.

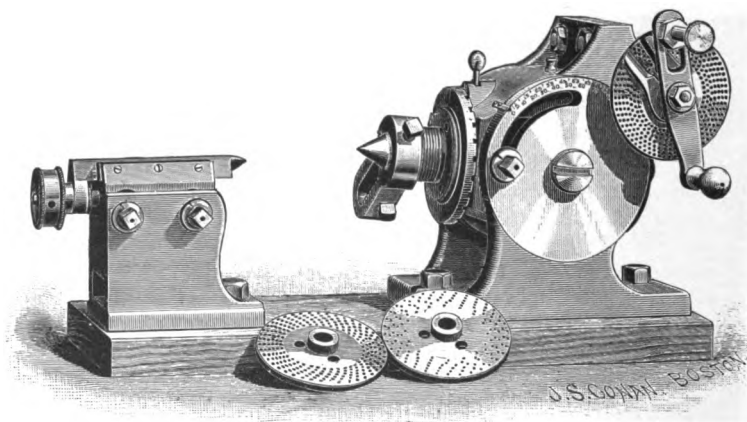
**Price, with three dial plates . . . . . \$**

*Brainard's New Patent Universal Head.*




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*Brainard's  
New Combination Head and Patent Back Centre.*



*Price and description of these machines on opposite page.*

### ***Brainard's New Patent Universal Head.***

---

**T**HIS new style head (see cut at top of opposite page) though not capable of as quick rotation as the second form, is better adapted for fine division, and especially for gear cutting. The dividing worm wheel is placed outside, to allow of as great diameter as possible, and is made in two parts, being divided longitudinally. The method of correction is the same as for our gear cutting engines, and for accuracy cannot be surpassed. It supersedes the old style head formerly put on our Universal Milling Machine.

It swings 9 inches, has  $\frac{1}{8}$ -inch hole through centre, and divides nearly all but some prime numbers to 360.

---

Price, with patent back centre . . . . . \$

---

### ***Brainard's New Combination Head with Patent Back Centre.***

---

**T**HE plan of this dividing head (see cut at bottom of opposite page) is novel, combining the directness of a notched dial with the accuracy of a worm wheel of most approved construction. Two independent systems of indexing are combined in it,—one for cutting gears or large milling cutters, the other for small work, or for finishing taps, reamers, nuts, bolt heads, etc. The most convenient tool ever used on a milling machine. : *See special circular.*

Swings 10 inches, has  $\frac{1}{8}$ -inch hole through centre, and divides most numbers to 360. Front dial has 24 notches.

---

Price . . . . . \$



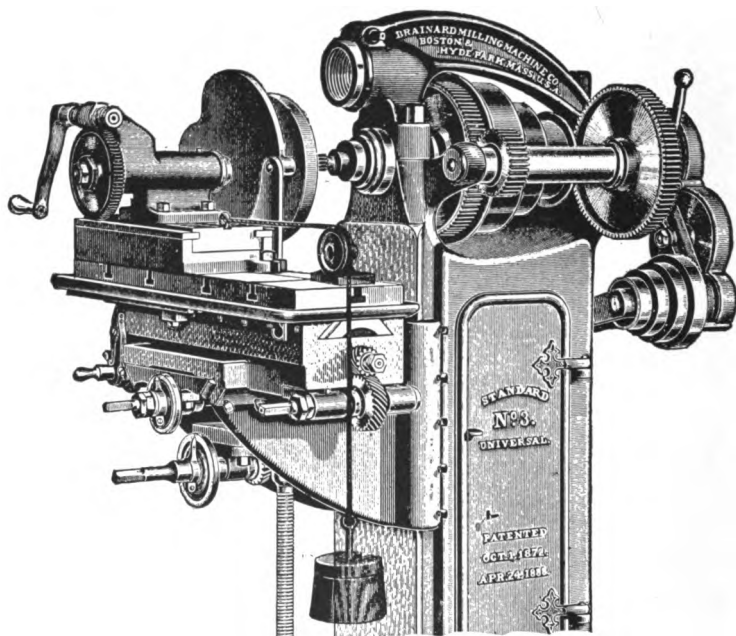
Small Plain Centres.



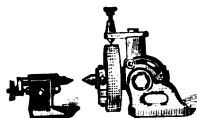
Large Plain Centres.



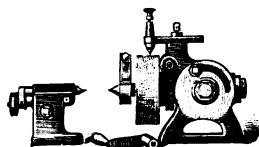
Heavy Plain Centres.



Cam Cutting Attachment.



Small Universal Centres.



Large Universal Centres.

## *Centres for Brainard Milling Machines.*

**Small Plain Centres.** Swing  $5\frac{1}{2}$  inches. Dial drilled in circles of 36, 30, 11, 8, and 7 holes.

Price . . . . . \$

**Large Plain Centres.** Swing  $7\frac{1}{4}$  inches. Dial has 9 circles of holes; viz., 120, 100, 96, 72, 56, 52, 44, 6, and 4.

Price . . . . . \$

**Heavy Plain Centres.** Swing  $9\frac{1}{2}$  inches. Circles in dial same as in "large plain" centres. Very strong and substantial, with provision for clamping both head and tail centres when work is heavy.

Price . . . . . \$

**Small Universal Centres.** Swing 6 inches. Head centre is adjustable through an angle of  $90^\circ$ , with graduated circle. Dial as drilled divides all numbers to 16, all even numbers to 32, with several other numbers to 120. Has Brainard's patent adjustable back centre

Price . . . . . \$

**Large, or No. 4 Universal Centres.** Swing  $9\frac{1}{4}$  inches. Head centre rotates through  $90^\circ$  angle, with circle graduated in degrees. Dial has 13 circles, divides all numbers to 26, all even numbers to 52, with several others to 120. Brainard's patent elevating back centre included.

Price . . . . . \$

Other centres are also made to swing 18, 20, 24, and 32 inches, and up to a weight of 700 lbs. Also automatic centres in which the movement of a lever withdraws the pin and rotates dial to proper point.

## *Cam Cutting Attachment.*

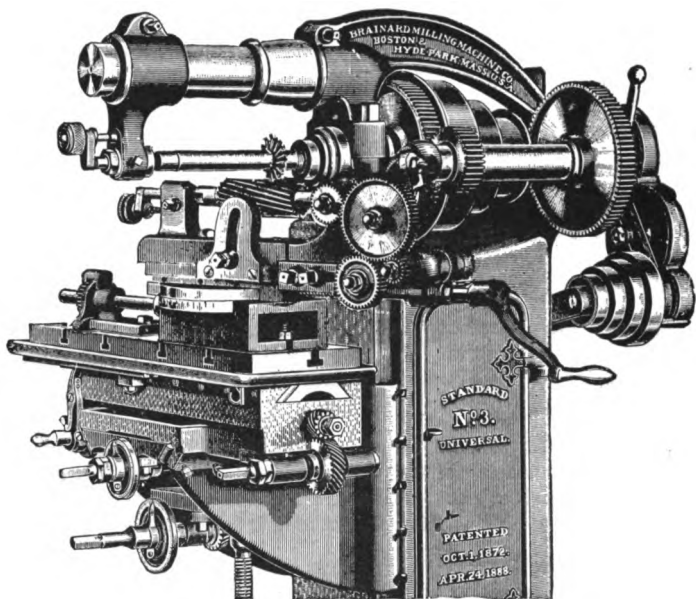
**CAN** be used on Nos. 1, 2, 3, or 4 machines; cuts face or cylinder cams as well and as fast as can be cut on a machine built especially for cam cutting.

Made in two sizes. 12-inch, designed for Nos. 3 and 4 milling machines: 18-inch, designed for Nos. 1 and 2 machines.

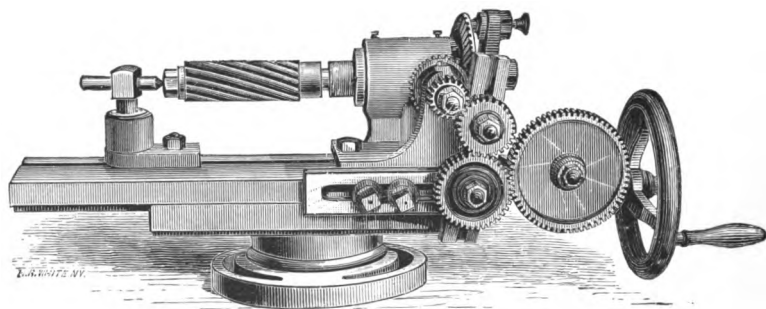
Price, 12 inch attachment . . . . . \$

" 18 " " . . . . .

*Automatic Spiral Cutting Attachment.*



*Hand Spiral Cutting Attachment.*



## *Brainard Milling Machines.*

---

### *Automatic Spiral Cutting Attachment.*

---

THE general mechanism in this is the same as in the Hand Spiral Attachment shown on opposite page, but is connected to the automatic feed mechanism of the machine, therefore will cut either by hand or automatically. This tool will also cut taper spirals either right or left hand. Dimensions same as the Hand Spiral Attachment.

Price, Automatic Spiral Cutting Attachment . . . \$

### *Hand Spiral Cutting Attachment.*

---

CUT at bottom of opposite page shows one of our three forms, and is that most commonly used. Being self-contained, it is preferable to more complicated arrangements; is capable of cutting to 8 inches long and 8 inches diameter, right and left hand, and from 2 inches to 6 feet pitch. The four gears as shown go with the tool, and give 12 different pitches, which are quite sufficient for all ordinary requirements. Any other gears furnished if desired.

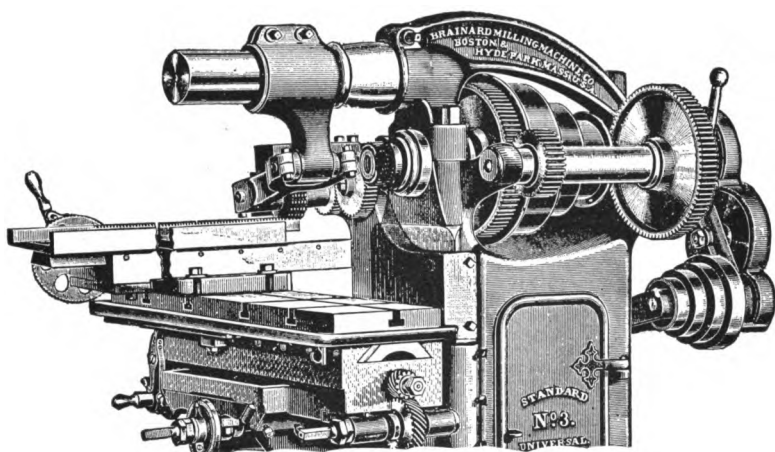
Price . . . . . \$

A smaller tool is provided for Nos. 4½ and 5 milling machines.

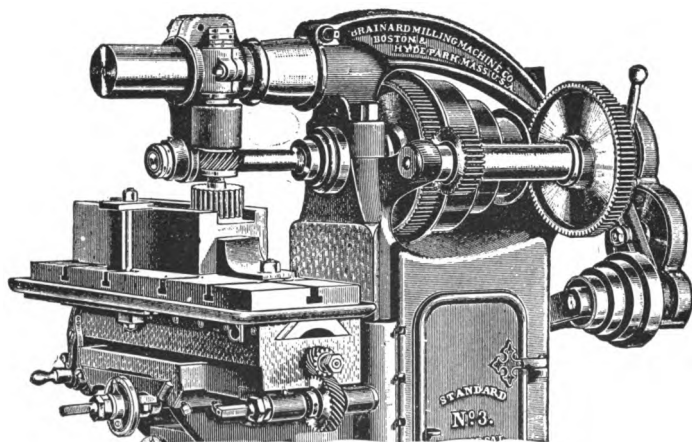
Price . . . . . \$

***Brainard Milling Machine Co.***

***Rack-Cutting Attachment.***



***Vertical Milling Attachment.***





## *Brainard Milling Machine Co*

---

### *Rack Cutting Attachment.*

---

**A**S illustration shows, the cutter runs in the same direction as when the machine is used for other purposes, and the regular automatic feed of the machine is utilized. The cutters, being supported both by the machine spindle and by the overhanging arm, are strongly held and powerfully driven, while the shoe or vise holding the rack is also held very firmly to the machine table by four bolts. The tool, as thus arranged, is nearly as efficient and convenient as a regular rack-cutting machine, and will cut from two to a dozen teeth at one time. As shown, it is cutting five teeth at once in a steel rack of four per inch pitch. It cuts 30 in. longitudinally, without shifting, 4 in. wide, and any length. The spacing is made by a ratchet-wheel, dividing accurately to thousandths of an inch.

Price, . . . . . \$

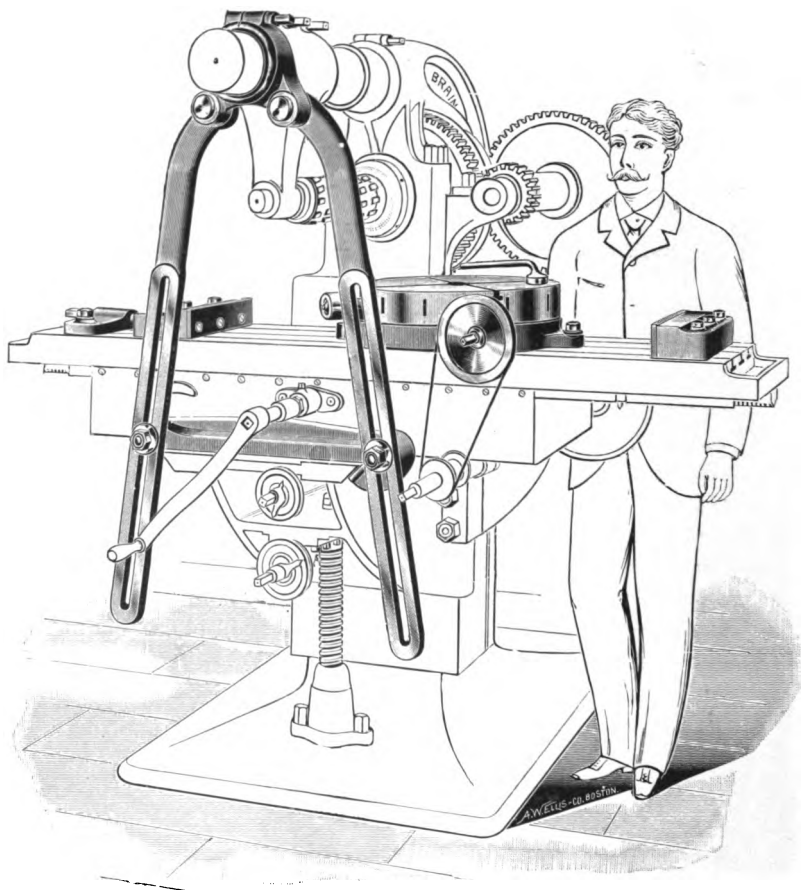
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### *Vertical Milling Attachment.*

---

**W**E regard this as a very important attachment which will soon be considered indispensable, as a large number of operations can be performed by it much more conveniently than in any other way. Spindle is driven by full power of machine. When put in place vertical spindle is sure to come at right angles. Provision for lost motion and for taking up wear combined. Drilling, die sinking, and profiling can well be done with this attachment.

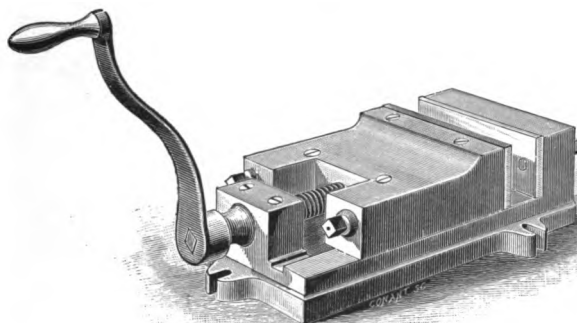
Price, . . . . . \$



Cut of Table Vise Holding Work Whole Length of Table also Cut of Automatic Rotary Milling Attachment, and of "Harness."

The above outline cut shows size and general character of our largest size Plain Machine No. 20.

## Brainard Milling Machine Co



8 Inch Flat Vise.

### Milling Machine Vises.



Round Base Vises are commonly used on the Universal Machines, and *Flat* Vises upon the Plain Machines. Flat Vises, however, can be used on Universal Machines when required, and the 8-inch flat vise is especially designed for such use, having ears on four sides and tenoned to fit all the grooves in work table. See cut.

We also make this vise and larger, so arranged that the two parts or jaws are separate, the work table of machine forming the bed or main part of vise. By this plan the distance that the vise will open is limited only by the length of table. We have patterns of this table vise up to 13-inch jaws. See vise on cut opposite.

Price of 6-inch Round Base Vise, (for Nos. 1, 2, 3 and 4), . . . \$			
" " 5 " "	"	(for Nos. 4½ and 5), . . .	\$
" " 4½ in. Flat	"	"	"
" " 6 inch	"	"	"
" " 7 " "	"	"	"
" " 8 " "	"	jaws 3-in. deep, weight, 130 lbs. . .	"
" " Table Vise	"	"	"

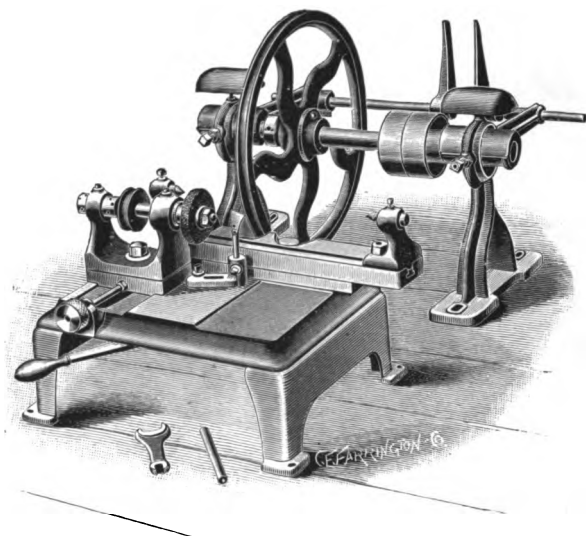
The Automatic Rotary Vise is an attachment specially adapted to vertical milling, and is to be used on work which on account of projections or otherwise, cannot be turned in a lathe, or which combines curves with straight milling work, etc.

Price, . . . . . \$

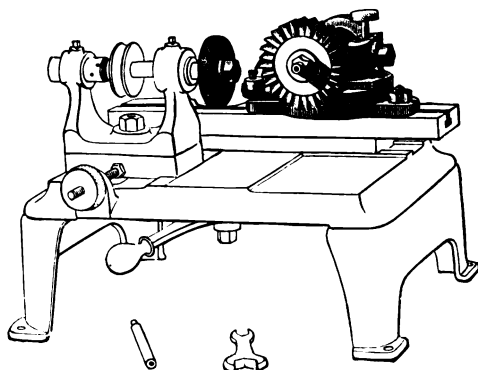
The "Harness" explains itself. It is an attachment applicable to any upright milling machine.

Price, . . . . . \$

*Improved Cutter Grinder.*



*Rotary Attachment.*



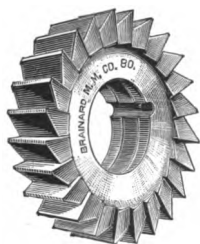
### Brainard's Small Mill Grinder.

**L**IGHT and convenient, but accurate and efficient. Grinds mills to 5 inches diameter and 5 inches long, either straight, taper, or spiral; also takes between centres, arbors, or reamers 12 inches long. Both emery wheel stand and cutter bed can be set at an angle. Within its limits combines the excellence of higher cost mill grinders. Included in price is countershaft, self-oiling boxes, wrench, and emery wheel. Wheels from  $\frac{3}{4}$  to 4 inches diameter can be used.

With this machine can be had a new rotary attachment, just introduced, which doubles the value of the machine. *See cut opposite.* This has a graduated base laid off in degrees, the upper half revolving to an entire circle. The front part of the upper section has a vertical movement, adjusted by the milled head screw shown. Speed of counter about 300 revolutions per minute.

Price, . . . . . \$

### Milling Cutters.



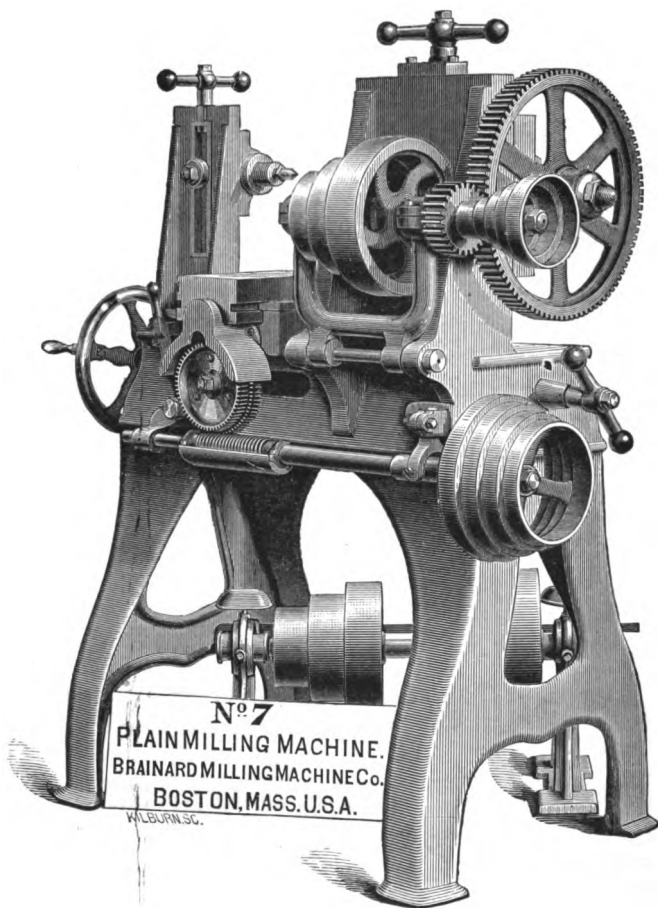
**W**E carry in stock, or can supply cutters of every form for every purpose

### Jobbing, or Sample Sets.

**C**ONSISTING of 10 to 20 cutters, etc., best adapted for general purposes, including cutters necessary for making all other ordinary kinds of mills, and affording samples of the best shapes and proportions of teeth. Especially valuable to parties just starting milling machines.

Price, . . . . . \$

*Brainard's No. 7 Plain Milling Machine.*



*Price and description of this machine on opposite page.*

### *Horizontal Milling Machines.*

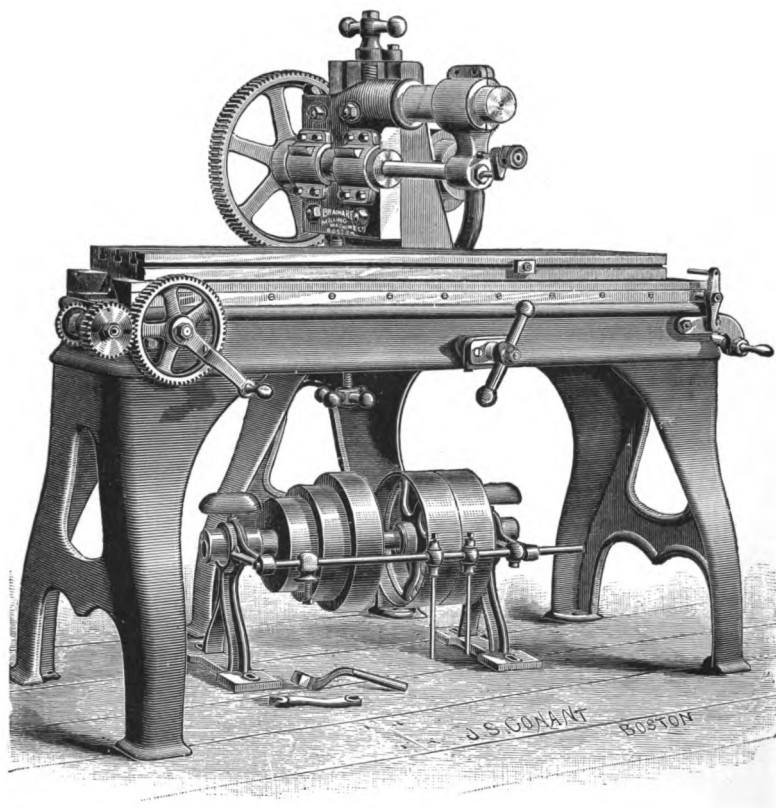
**I**N this type of machines the table remains of a fixed height while the spindle is raised and lowered to suit thickness of work. This class of machines is adapted to work done on table or in vise and of any moderate depth and generally to situations where duplicate pieces are to be made in large quantities.

The so-called Plain machines of the general character illustrated opposite are of three sizes. They are extremely heavy and rigid for their capacity, and all details are of the best possible character for power, accuracy, and durability. The No. 8 is made with overhanging arm instead of tail stock, and the No. 7 also, if preferred.

#### PRICES AND DETAILS.

	No. 6.	No. 7.	No. 8.
Length of table . . . . .	46 inches.	26 inches.	24 inches.
Width of table . . . . .	8½ "	....	6 "
Longitudinal feed . . . . .	20 "	13 "	10½ "
Cross adjustment . . . . .	5 "	....	4¾ "
Greatest height of spindle, centre above table . . . . .	12½ "	8 "	6½ "
Least height of spindle, centre above table . . . . .	2½ "	....	....
Counter pulleys . . . . .	14 x 4 in.	....	....
Speed countershaft . . . . .	135	100	100
Weight . . . . .	3,000 lbs.	1,400 lbs.	950 lbs.
Price . . . . .	....	....	....

*Brainard's 50 Inch Milling Machine.*



*Price and description of this machine on opposite page.*



***Brainard Long Feed Horizontal Milling Machines,  
FOR HEAVY WORK.***

---

**M**ACHINES of this type include tools of great size and power. We illustrate in this and the following pages, a few of the machines of this character that we supply.

***50-Inch Milling Machine.***

---

**A**DAPTED for any plain work, but particularly for key-seating shafting. It will cut at one operation a key-seat 1 inch wide by  $\frac{1}{2}$  inch deep, with a feed of 30 inches per hour, or will cut two to four small ones at once. Sinking cuts can also be taken in the centre of shafting. Work table and automatic feed, 50 inches; will take 11 inches under centres. The length of table and feed can be increased to 6 or even 7 feet, if required. *See cut on opposite page.*

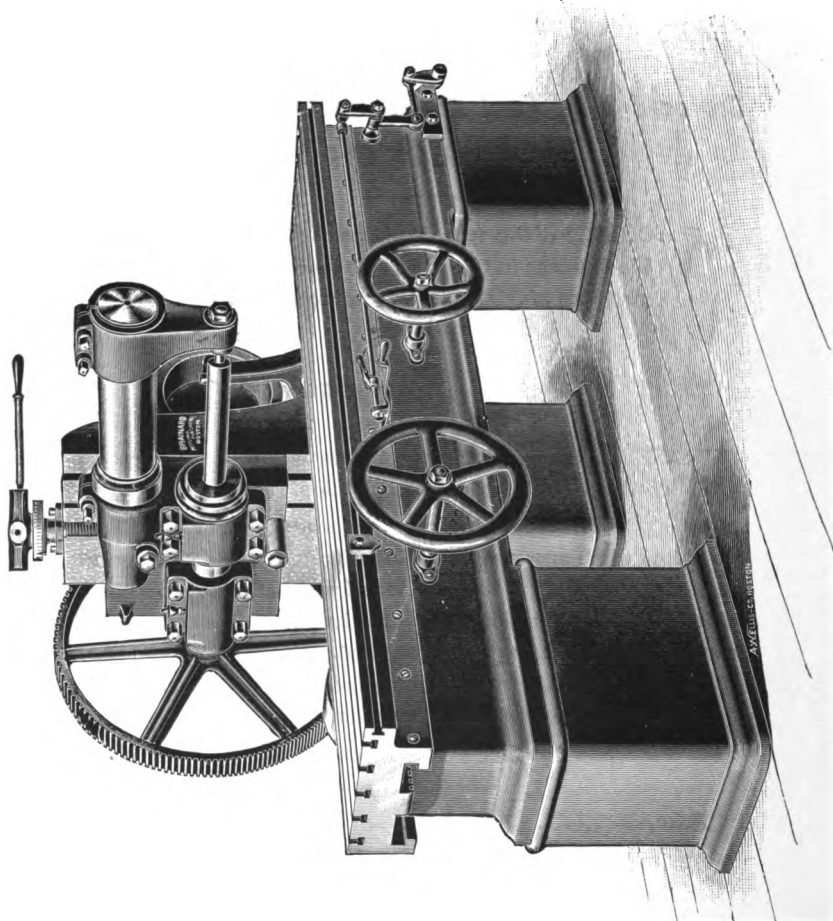
Size of tight and loose pulleys, 14 inches x  $3\frac{1}{2}$  inches. Speed of countershaft, 120 revolutions per minute.

Weight, 2,200 pounds.

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Price, . . . . . \$

*72 Inch Milling Machine.*



### ***Brainard's 72 Inch Milling Machine.***

**T**HE 72-inch Milling Machine is a massive machine of great power, originally intended for use in key-seating heavy shafting, but equally adapted for general work of heavy or long milling. Work table will take two shafts 8 inches in diameter, and key-seat both at once, or one shaft to 12 inches diameter. Is strong enough to put in any width or depth of key-seat required at one cut. Work table sets low, for convenience of handling heavy work, and is run back by power.

Length of feed, 6 feet. Solid steel spindle,  $3\frac{1}{2}$  inches diameter. Arm for supporting outside end of mill spindle, 5 inches diameter at its smallest part, takes a mill 10 inches diameter, and mills 15 inches from front of machine. Perpendicular range of head,  $12\frac{1}{2}$  inches. Highest point of centre from table,  $13\frac{1}{2}$  inches. Size of tight and loose pulleys, 16 inches  $\times$   $4\frac{1}{2}$  inches. Speed of countershaft, 120 revolutions per minute.

Weight, 5,000 pounds.

Price . . . . . \$

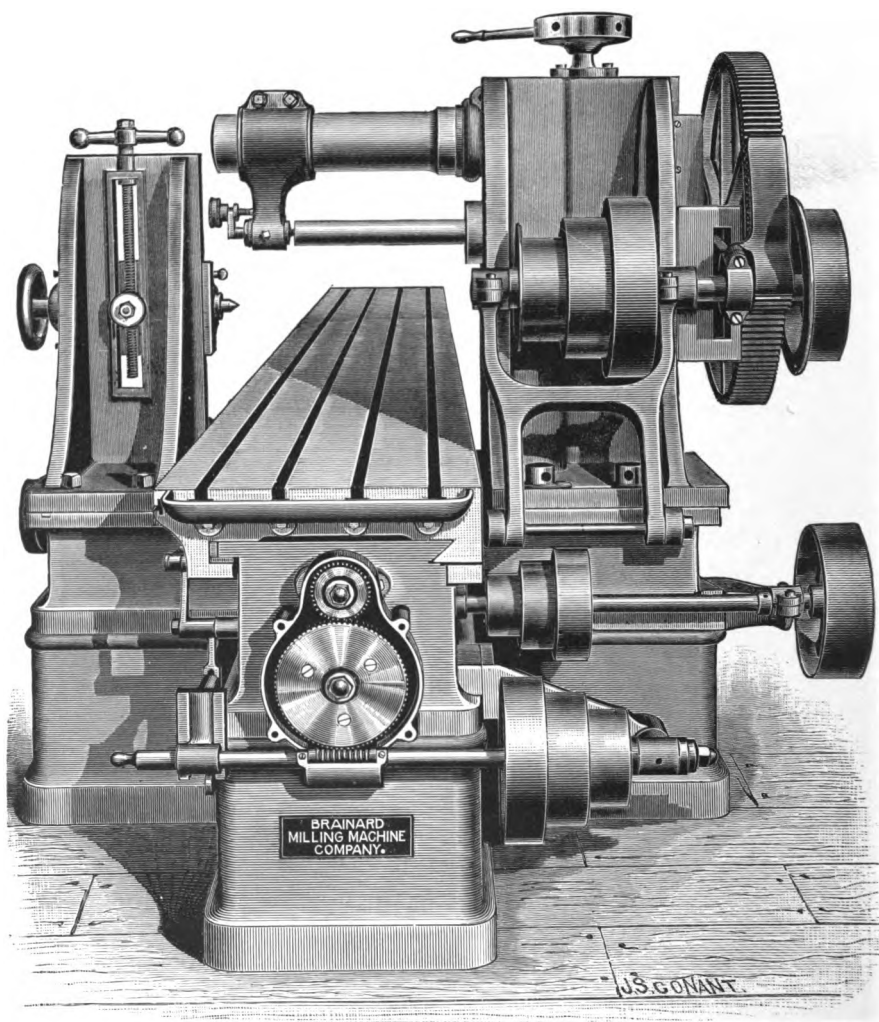
*Photograph of 72-inch Machine sent on application.*

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We also make a special 72 inch, having the head, spindle, and driving gear of the 84 inch described on next pages. Weight, 6,000 lbs.

Price, . . . . . \$

*Brainard's 84 Inch Milling Machine.*



*Price and description of this machine on opposite page.*

## 84 Inch Milling Machine.

*Made by Brainard Milling Machine Company.*

**T**HIS machine is massive in all its parts, and is intended for heavy milling of any description, but more particularly for shafting, railroad or engineering shops, being specially adapted for key-seating long and heavy shafting, finishing guide bars, connecting rods, etc.

The machine table sets low on a bed supported by four box legs, and is actuated by a steel screw, driven by a worm and worm gear connected with a pair of spur gears; all gearing being outside of the bed.

The carrier, upon which is mounted the driving spindle, is gibbed to the head; and from this carrier projects a large arm for outside centre support of mill spindle, intended for use on work where a back stand is not admissible. There is, however, as shown in the cut, a back stand or tail stock of very solid character. The arm is readily removable when desired, or the tail stock can be slid off its seat if required.

The table, which weighs a ton, is arranged to be run back rapidly by power, by a device not shown in the engraving.

All the operations of the machine are intended to be conducted from the front side, without any change in the position of the operator. The feed can be thrown out by hand at any point, or dropped automatically by an adjustable dog. The feed is thrown in by a foot lever, or can be worked from the front end of machine, as required. While the work table is intended to run back by power, it can also be operated by hand in either direction.

Work table is 7 feet long  $\times$  20 inches wide. Longitudinal automatic feed, 84 inches. Cross adjustment of head in line with spindle, 2 inches. Elevation of centres above work table, 18 inches. Distance between head and tail stock, 24 inches. Spindle, solid steel, 4 inches diameter in front bearing. Cone takes  $3\frac{1}{2}$ -inch belt. Driving gear, 30 inches diameter on pitch line. Mill arbor,  $2\frac{1}{2}$  inches diameter, fitted 10 inches deep in spindle. Arm centre support, 5 inches diameter at smallest part. Size of tight and loose pulleys, 16 inches  $\times$   $4\frac{1}{2}$  inches. Speed of countershaft, 120 revolutions per minute.

Weight, 7,500 pounds.

Price, complete . . . . . \$

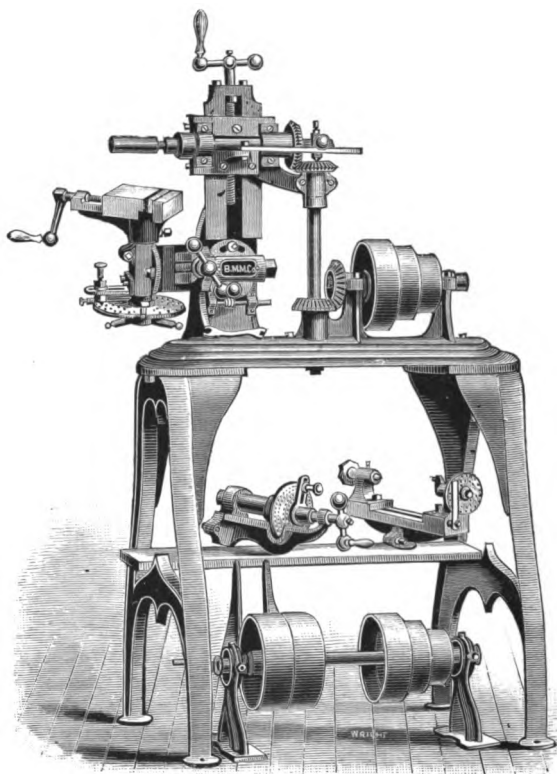
Ninety-six inch machine is made in the same general style, and takes 40 inches between heads with wider table.

*Photographs on application.*

Price, . . . . . \$

## *Index Milling Machine.*

MADE BY BRAINARD MILLING MACHINE COMPANY.



*Price and description of this machine on opposite page.*

## ***Index Milling Machines.***

***Made by Brainard Milling Machine Company.***

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### ***Small Index Milling Machine.***

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**I**NDEX and mill spindles are large, and the machine is strong and compact. Mill spindle driven without binder or weight. When not in use for cutting gears, the index spindle may be solidly clamped; so that when using a vise, centres, or spiral cutter, no strain or injury can come upon the index plate or pointer. Mills  $10\frac{1}{2}$  inches long and  $7\frac{1}{2}$  inches high, and will cut gears up to 8 inches in diameter.

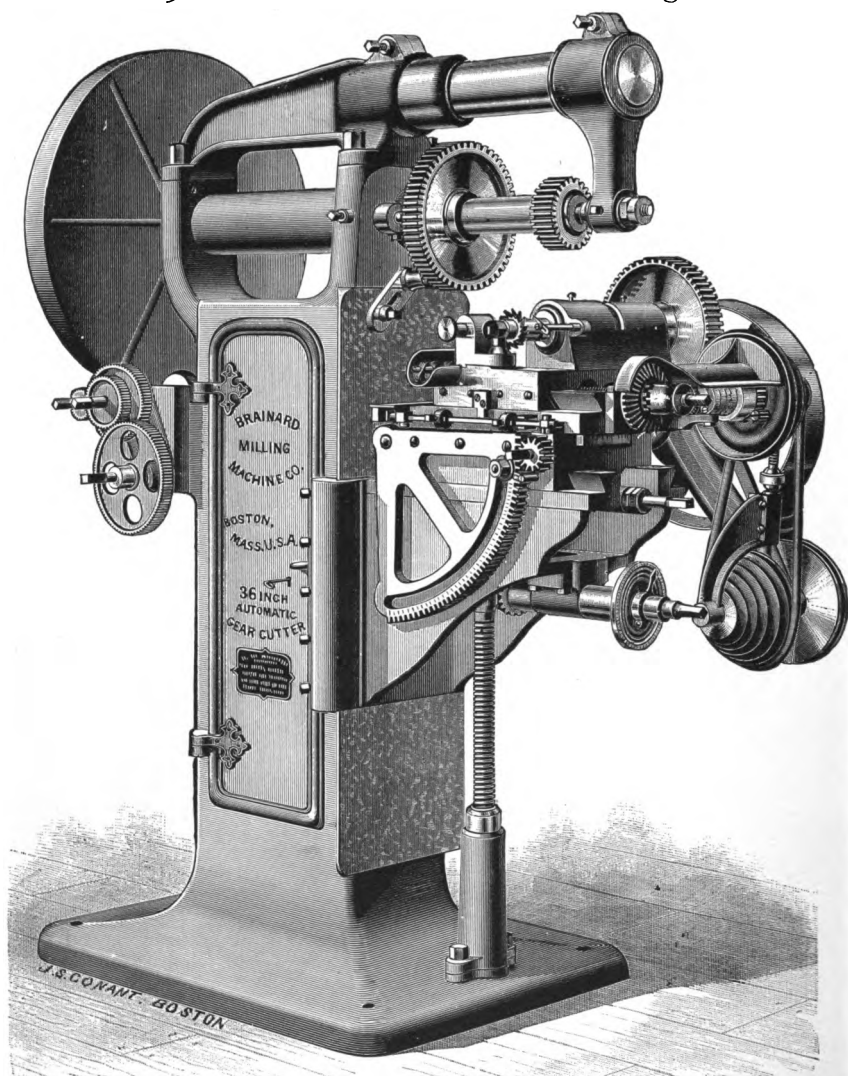
The centres will take in a piece 10 inches long, and the spiral cutter cuts four different pitches 3 inches long; extra sleeves giving other pitches of spirals furnished when desired.

Speed of countershaft, 140 revolutions per minute. Size of tight and loose pulleys, 10 inches diameter,  $2\frac{1}{2}$  inches face. Weight, 600 pounds.

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Price, without attachments . . . . .	\$
“ for vise, extra . . . . .	
“ “ centres, extra . . . . .	
“ “ spiral cutter, extra . . . . .	

*Brainard's 36 Inch Full Automatic Gear Cutting Machine.*





## *Full Automatic Gear Cutting Machines.*

*Made by Brainard Milling Machine Company.*

**A**FTER many years of study and experiment, we offer an **Automatic Gear Cutting Machine**, that, for accuracy, simplicity, convenience, efficiency, and economy, meets the highest requirements.

As its name implies, it is **Automatic** in all its movements. After being set and started, the cutter feeds through the gear blank, returns rapidly to the starting-point, the dividing wheel rotates to the exact place for the next tooth, and repeats the operation indefinitely, without further attention from the operator.

**ACCURACY.** — **The Dividing Wheel**, by improved processes, is brought to practical perfection, the final corrections being made under a microscope. This wheel is actuated by a steel worm, with compensating devices for maintaining the original accuracy. It is protected from dust and injury by a close-fitting iron shield, and the actuating worm runs in an oil box.

**SIMPLICITY.** — Much thought has been given to reduce the mechanism to the simplest forms, and to have *all the working parts in sight*.

**CONVENIENCE.** — The machine is so comprehensive in this view, that we simply enumerate its conveniences. A centering device fixes the exact centre of cutter, without reference to the position of the knee or other parts. A dial reading to thousandths of an inch, connecting with the elevating screw, enables the cutter to be set to the correct depth without using lines or depth gauges. One of the quadrants, which sustain the cutter carriage at any required angle, is graduated to degrees. The cutter carriage itself can be set at any angle horizontally as well as vertically, and has a scale, graduated to degrees, fixing the angle.

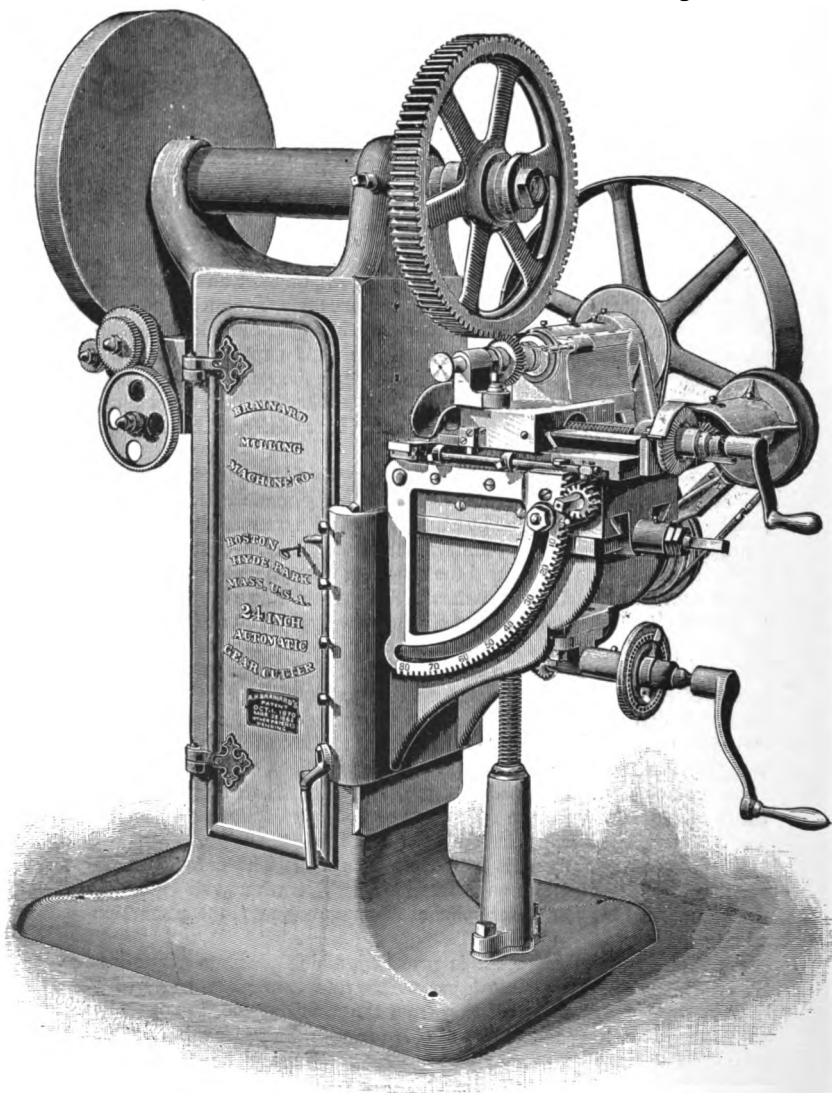
**The Automatic Feed** is by differential gears. The cutter carriage runs back 33 times as fast as it feeds forward, yet without shock or any reversal of feed belts or cutter spindle. This movement is the admiration of all mechanics.

An **Adjustable Rim Rest** is provided, which prevents chattering. The working parts are in *the strongest position when cutting the largest gears*.

**The Cutter Spindle**, differing from the usual custom, is not made solid, but has a long taper centre hole to receive the cutter arbor. This feature allows any number or sizes of cutter arbors to be used. **The Cutter Arbor** has an outer centre support, which not only prevents vibration, but allows smaller cutters to be used than is possible when the cutter spindle is solid, and cutters must be used close to bearings.

[Continued on page 199]

*Brainard's 24 Inch Full Automatic Gear Cutting Machine.*



**Full Automatic Gear Cutting Machines — continued.**

**A Radial Clutch** upon the feed screw connects and disconnects the feed works. When disconnected, the machine can be worked by hand: so the operator can make the adjustments, and assure himself that all the machine movements are properly timed, before making the automatic connection. It also allows the gear blank to be rotated to any position for examination after one or more teeth have been cut.

**The Locking Disk** makes but one revolution, whatever the number of teeth to be cut; and the locking bolt, having but one seat in the disk, necessarily locks it always in the same place. Mistakes in dividing are, therefore, impossible when the change gears are properly set.

To the locking disk is secured a second disk of equal size, fixed to the worm shaft, and laid off in degrees. By slacking the connecting bolts, this disk can be rotated to any degree; thus turning the dividing wheel, and with it the gear blank as desired, while all other movements are stopped. The "set over" for bevel gears is thus fixed with accuracy and certainty.

**The Change Gears** — 50 in number — are fitted in a wooden case occupying the body of the machine, each in its own compartment; any gear, therefore, can be selected without loss of time, and all are kept clean and bright. As accuracy of work depends nearly as much upon the perfect condition of the change gears as upon that of the dividing wheel, the custom of hanging change gears in the dust and dampness of a machine shop, or leaving them on the benches or floor, results in inferior work.

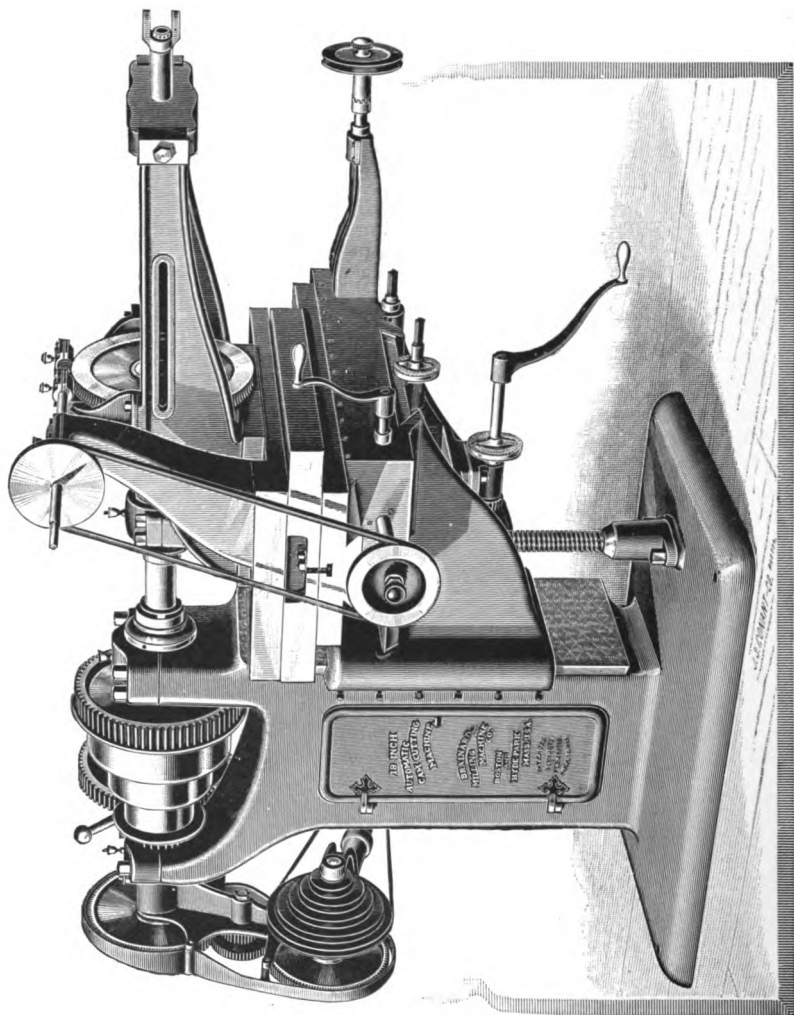
On the 24-inch machine, and all other larger sizes, an *overhanging arm* is furnished when so ordered. This answers two purposes: first, supporting firmly the outer end of mandrel, thus allowing strings of gears to be cut more perfectly than is possible when supported by one end only; and, second, gear blanks, after having been made ready in the lathe, can be transferred without removal from the mandrel to the gear cutting machine, and *cut between centres*, obviating the making of numerous special mandrels.

**PRICES.**

60 Inch . . . . .	\$
48 " . . . . .	
36 " . . . . .	
24 " . . . . .	
18 " . . . . .	

The 60 in. (cuts not yet prepared), is arranged with different details from the smaller sizes, adapted for the very heaviest classes of work, etc.

*18 Inch Automatic Cam Cutting Machine.*



## ***Automatic Cam Cutting Machines.***

*Made by Brainard Milling Machine Co.*

THE engraving on opposite page shows the largest size at present made of our Automatic Cam Cutting Machines.

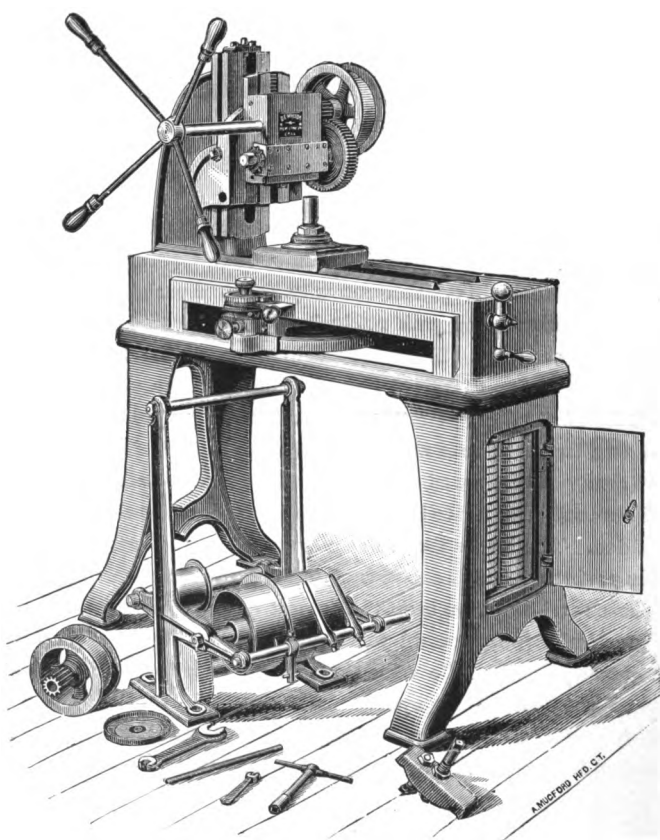
This tool will cut automatically, face and periphery cams to 18 inch diameter, and path  $2\frac{1}{2}$  inch wide, with smoothness, ease and entire accuracy. The same machine can readily be arranged to cut face cams to 24 inch if desired. The machine weighs about 8,000 lbs., and all the parts are massive in their proportions.

A smaller machine is made which cuts to 11 inch diameter, and is so arranged that the cam cutting parts can readily be disconnected and removed so as not to interfere with its use as a first-class milling machine. The larger tool can be arranged in the same manner, when preferred, though as shown, it is intended for cam cutting only.

These machines have been the subject of experiment and study by practical men for several years, and are now but just offered to the general public. We offer them as far superior to anything heretofore built for the purpose.

Any modifications made, and any size built to suit customers. Detailed information freely given and correspondence solicited.

*Whiton's Gear Cutting Machine.*



### *Whiton's Gear Cutting Machine.*

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**T**HIS machine is simple, strong, and compact, and designed for the use of cotton factories, tool and general machine and repair shops. It will perform all classes of gear cutting with great accuracy and despatch.

It occupies a floor space of  $24 \times 48$  inches, and weighs, when ready for shipment, about 900 pounds.

It will cut every number to 100, every even number to 186, and has a very wide range of higher numbers.

It is furnished with all necessary change wheels, tables of division, wrenches, etc., one blank arbor, with nut for withdrawing same, and an adjustable rim rest. Two driving pulleys are furnished with each machine, thus allowing one change of speed.

It will cut spur, bevel, and worm wheels to 32 inches diameter by 8 inches face, up to 6 diametral pitch, in steel, iron, brass, or wood, and is especially effective on all sizes under 15 inches.

It may be set at any desired angle for bevel gears by an accurately graduated arc, and has a graduated adjustment either side of the vertical, so that it may be easily set for cutting wheels to be operated by worms of almost any pitch; also for trimming the sides of bevel gear teeth, when set over at any angle. The cutter may be adjusted to the centre, or half an inch either side if desired.

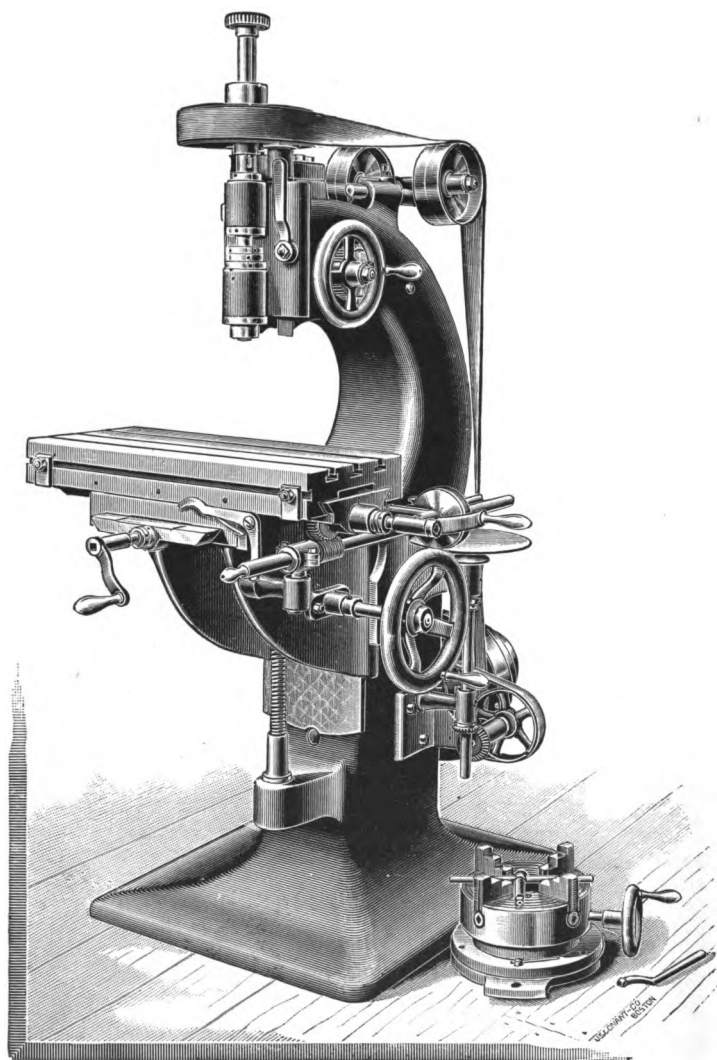
The cutter is fed through the blank by hand, as shown,—a method necessary by reason of the low price of the machine, and also one by which the largest amount of work (particularly of light work) may be accomplished.

The countershaft should make about 275 revolutions. Pulleys are 7 inches diameter by  $2\frac{3}{4}$  face.

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Price . . . . . \$

*Becker Vertical Miller, No. 3.*





### *Vertical Milling Machines.*

**T**HESE belong to a class of tools now coming into notice and which are destined to have a very extended use, as there are many operations which can be performed more cheaply on them than in any other way.

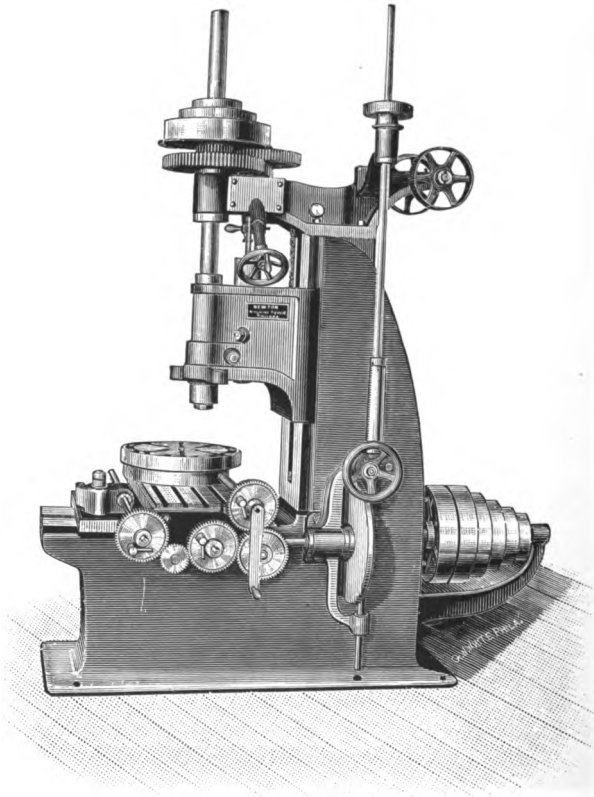
**THE BECKER VERTICAL MILLERS**, of which the No. 3 on opposite page is an illustration, are exceedingly well made tools. Spindle heads of No. 2 and 3 traverse vertically. These machines are adapted for boring or sinking cuts. Spindle to driving pulley is on an independent bearing, relieving the spindle of one sided wear. Feed of No. 3 is by disk.

The rotary chuck is a very important part of this machine.

#### DETAILS.

	No. 1.	No. 2.	No. 3.
Vertical movement spindle . . . . .	Fixed.	3 inches.	4 inches.
Table feed . . . . .	12 inches.	....	16 "
Cross feed . . . . .	10 "	....	11 "
Counter pulleys . . .	3 x 5 in.	{ 8 x 3 in. 12 x 3 "	....
Counter revolutions, according to work. }	200 to 1,000	{ 500 to 1000 100 to 200 }	{ 200 to 600 80 }
Price . . . . .	....	....	....
Price, rotary chuck . .	....	....	....

*Newton Vertical Miller.*



***Newton Machine Co.'s Vertical Milling Machines,***  
**FOR HEAVY WORK.**

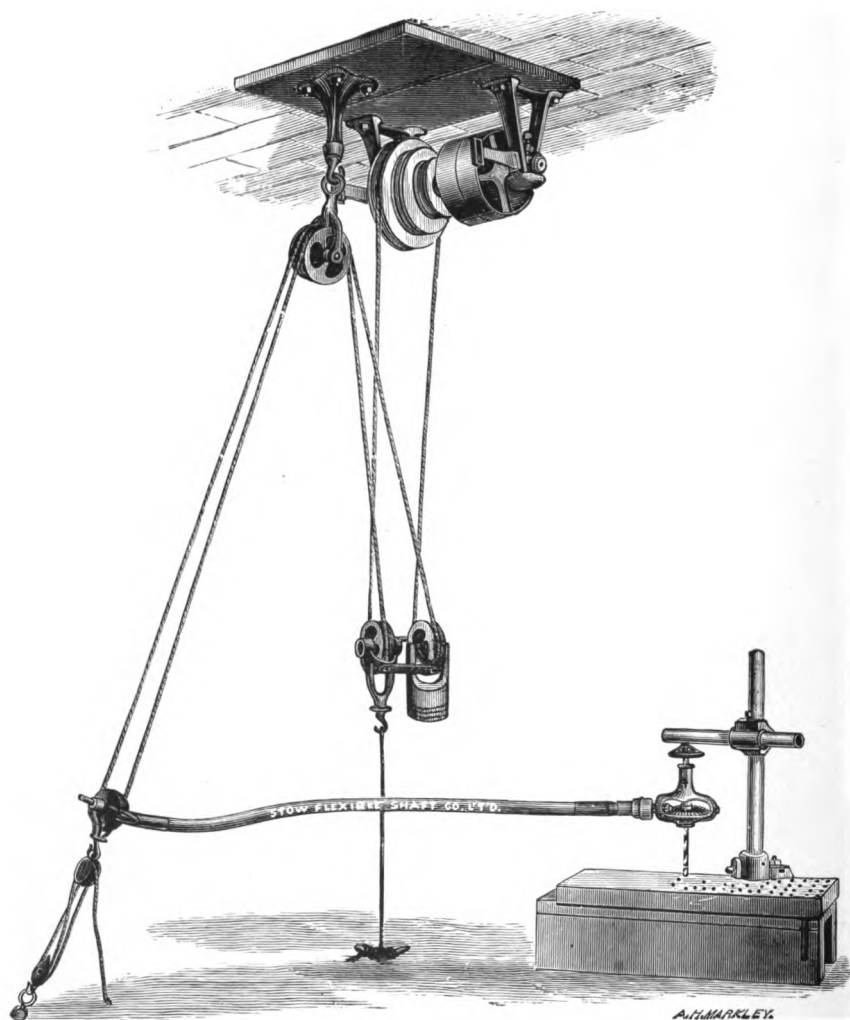
**A** VERY large share of the work done on a slotter, can be done to better advantage on a machine of this type, of which the cut opposite is an illustration.

Spindle bearings raise and lower to hold cutter close to the work, whatever its thickness. Table has longitudinal cross and circular feeds, by power, all reversible.

**DETAILS.**

	No. 1.	No. 2.	No. 3.
Height work it will take, . . .	12 in.	15 in.	15 or 20 in. as desired.
From spindle centre to column,	16½ in.	23 in.	28 in.
Diameter of table, . . . . .	16 to 22 in. as desired.	25½ to 32	30 to 42
Greatest size spindle, . . . .	4¼ in.	7 in.	8 in.
Price, . . . . .	....	....	....

*Stow Flexible Shaft Co.'s Complete Portable Drill.*



### *Stow Flexible Shaft Drills.*

**T**RANSMITS rotary motion to any desired distance from the power source, through any number of curves, thus allowing the power to be carried to the work instead of the work to the power.

This apparatus has now been so long in use as to be thoroughly established. Its applications are innumerable.

Among the fixtures to be used with this shaft, and supplied with it when desired, are :

**SCREW FEED DRILL PRESS** (shown in use in the cut opposite). The **BREAST DRILL**. The **PEDESTAL DRILL**. The **CORNER DRILL PRESS**. The **PULLEY HUB DRILL PRESS**. The **TAPPING AND REAMING MACHINE**. The **FLUE CUTTER**. The **AIR PORT CUTTER**. **GRINDING MACHINES** for almost every variety of work. **WOOD AND STONE** Drilling and Working Machines, etc.

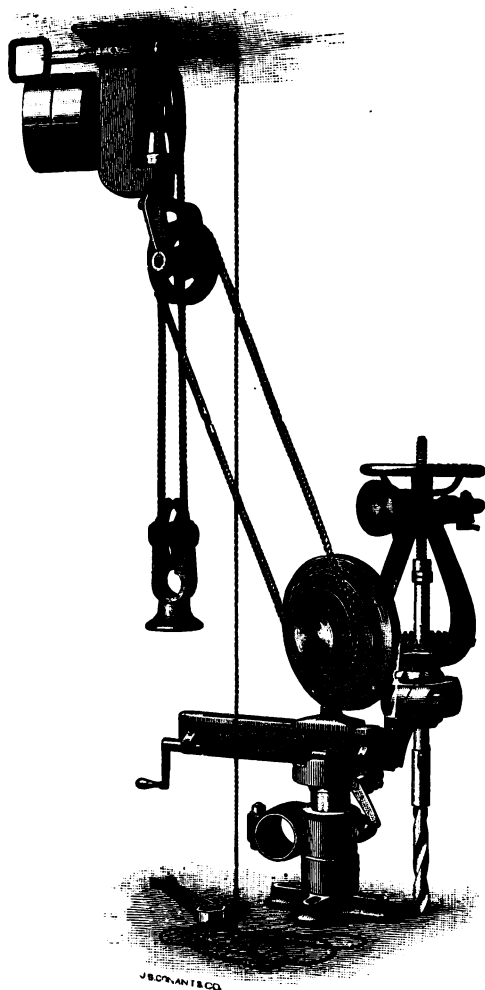
Special cuts of fixtures adapted to almost every variety of work will be mailed on application.

Special Portable Electric Motors are now supplied with these machines when desired.

**PRICE LIST OF COMPLETE PORTABLE DRILL, WITH RAWHIDE BELT.**

	Capacity.	Price.		Capacity.	Price.
No. 3.	Drills to $\frac{1}{4}$ in.		No. 6.	Drills to $1\frac{5}{8}$ in.	
" 3.	" $\frac{1}{2}$ "		" 8.	" 2 "	
" 4.	" $\frac{3}{8}$ "		" 6	" $2\frac{1}{2}$ "	
" 5.	" $1\frac{1}{8}$ "		" 8	" 3 "	
" 6.	" $1\frac{1}{4}$ "				

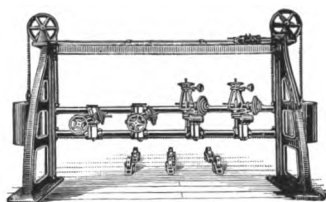
*The Dallett Portable Drill.*



# Dallett Portable Drilling Machines.

THESE Machines can be placed as easily as a ratchet brace and will drill at any angle, in any position, at any distance, and in any direction from the power. Are especially adapted to drilling all pieces which are inconvenient to move, or which cannot be readily adjusted under stationary Drilling Machines.

	Will drill up to a diameter of	Vertical adjustment of Post.	Spindletraverses	Diameter face of tight and loose pulleys.	Weight of Machine.	Complete with 100 feet Rawhide Rope and 3 pairs Couplings.
No. A..	$\frac{3}{4}$ in.	5 in.	4 in.	$9 \times 2\frac{1}{2}$ in.	75 lbs.	
No. B...	1 in.	5 in.	$5\frac{1}{2}$ in.	$9 \times 2\frac{1}{2}$ in.	110 lbs.	
No. 1...	1 in.	5 in.	$5\frac{1}{2}$ in.	$10 \times 3$ in.	130 lbs.	
No. 2...	$1\frac{1}{2}$ in.	6 in.	$5\frac{1}{2}$ in.	$10 \times 3$ in.	250 lbs.	
No. 3...	2 in.	6 in.	8 in.	$10 \times 3$ in.	285 lbs.	
No. 4...	3 in.	6 in.	13 in.	$10 \times 3$ in.	400 lbs.	
No. 5...	any	8 in.	22 in.	$16 \times 3\frac{1}{2}$ in.	900 lbs.	



**Boiler Shell Drill.**

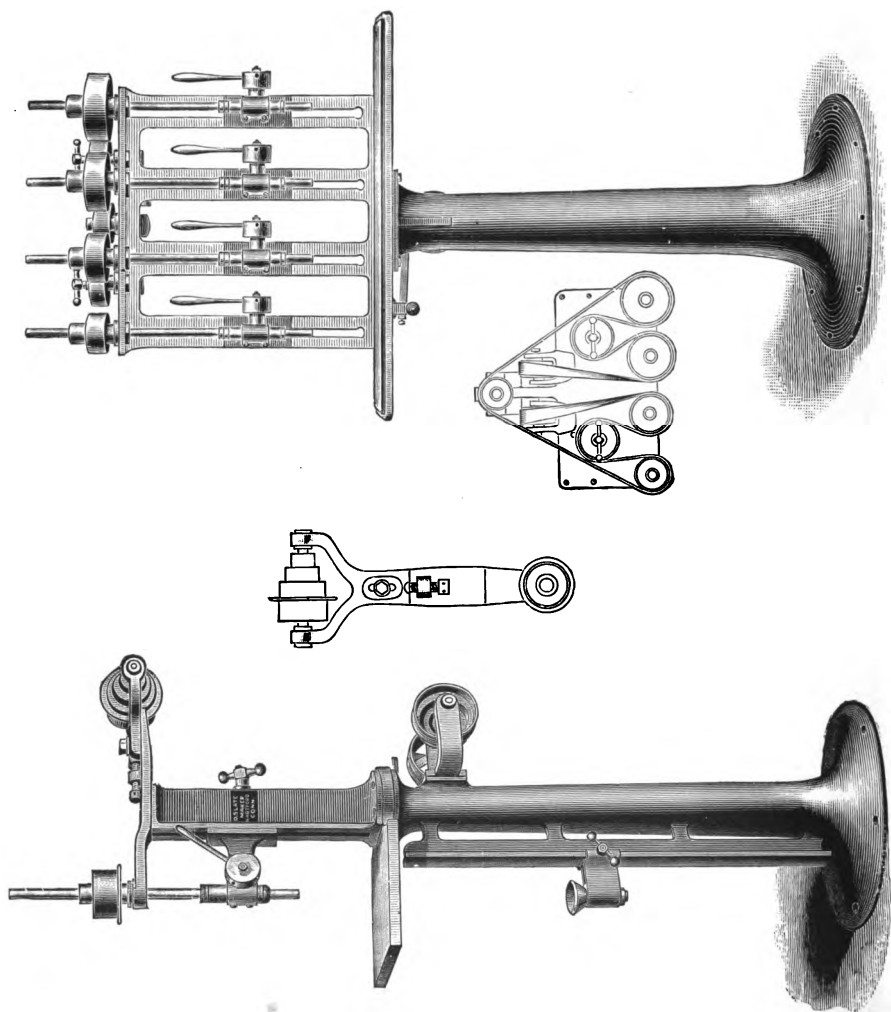
DESIGNED for drilling rivet holes in boiler shells after plates are bent and bolted together; also adapted for drilling and tapping stay bolt holes, cutting flue holes, etc; also in machine shop it is particularly suited to drilling large castings.

Will drill at any angle and any distance apart.

Horizontal range, 13 feet Vertical range of cross head, 7 feet. Heads have drilling traverse of 15 inches. Weight, with four heads, 13,600 pounds.

Price, . . . . . \$

*Slate's Sensitive Drills.*





*Slate's Sensitive Drills.*

IN these tools the weight of spindle is compensated by an adjustable spring. The spindles are driven by a pulley supported by a stud so that all side strain of belt is removed, and are actuated by an endless belt with adjustable tension.

These drills are 13-inch swing. Spindles  $\frac{3}{4}$ -inch diameter, are adjustable in height.

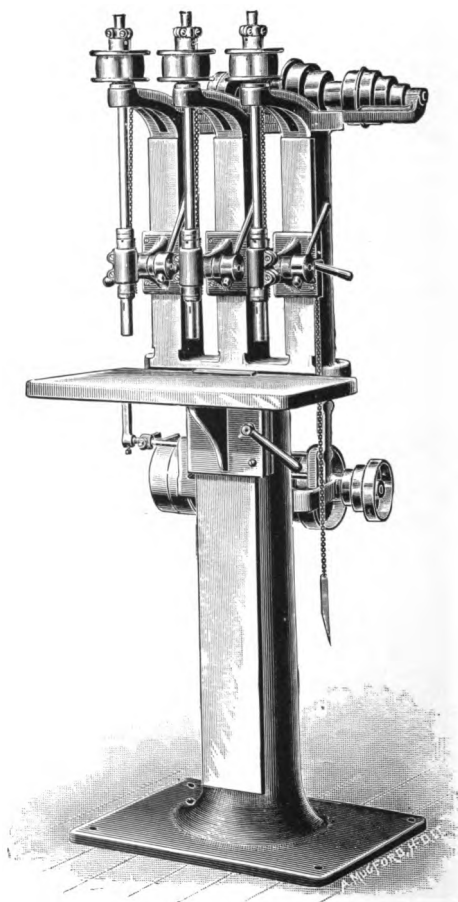
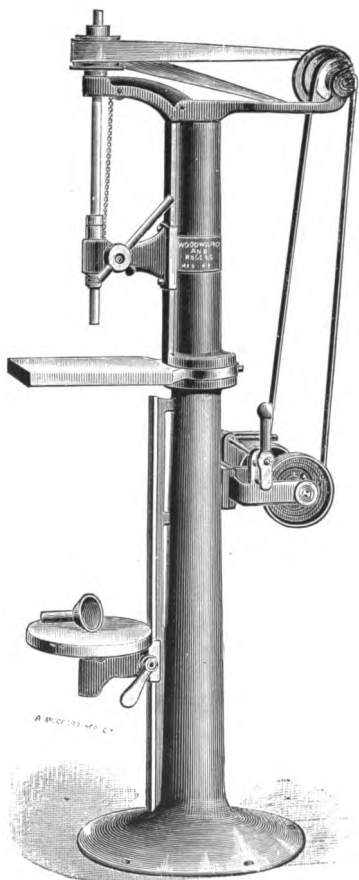
The multiple spindle drills have adjustable tables, and the spindles can be independently adjusted to height, and by different sized pulleys can have different speeds.

Will drill to  $\frac{1}{2}$ -inch hole.

**DETAILS AND PRICES.**

No. of spindles . .	1	2	3	4
Size tight and loose pulleys . . . .	4 x 1 $\frac{5}{8}$ in.	8 x 2 $\frac{1}{4}$ in.	8 x 2 $\frac{1}{4}$ in.	8 x 2 $\frac{1}{4}$ in.
Speed of same . .	400	250	250 to 300	250 to 300
Price . . . . .				

*Woodward & Rogers Drills.*



### *Woodward & Rogers 1, 2, and 3 Spindle Drills.*

**T**HESE Drills are intended for all kinds of accurate and light work up to  $\frac{1}{2}$  inch holes.

The spindles are counterbalanced by a weight and are adjustable by moving the arm which is gibbed to the front of the upright, having a traverse of 13 inches from the upper table.

The throw of the spindles by the feed lever is  $3\frac{5}{8}$  inches.

The rack for moving the spindle is steel.

The distance from the centre of the spindles to the column is 6 inches.

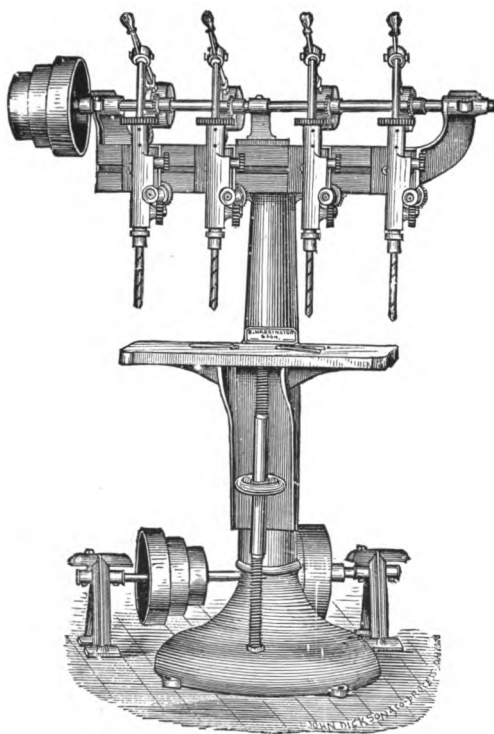
The upper table in the single spindle can be turned out of the way.

The tight and loose pulleys are  $4\frac{3}{4} \times 1\frac{3}{4}$  inches. The speed for general work should be 350 revolutions.

---

Price, 1 spindle drill, . . . . .	\$
“ 2 “ “ . . . . .	
“ 3 “ “ . . . . .	

*4 Spindle Multiple Drill.*



## No. 1 Multiple Drill.

### 4 SPINDLES.

**W**ILL drill four  $\frac{5}{16}$ -inch holes at once. Spindles have hand and power feed; balanced, quick return by lever; lateral adjustment, one or more may be run at same time, any desired speed by arrangement of gearing; table has vertical adjustment by right and left screw; spindle to column,  $7\frac{1}{2}$  inches; shortest distance between spindles,  $4\frac{1}{2}$  inches.

Countershaft and pulleys, 12 x  $3\frac{1}{2}$  inches, to run 350 turns per minute.

Shipping weight,                      pounds.

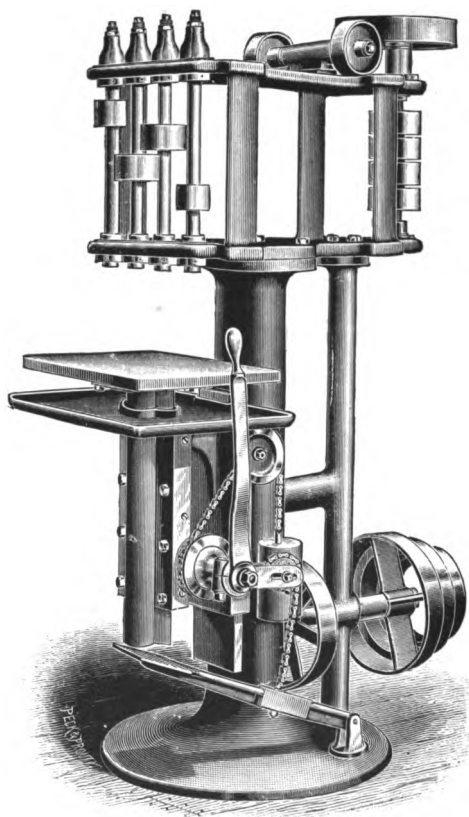
Price, 4 spindles . . . . .	\$
“ per spindle, extra . . . . .	

We supply a heavier form of same machine. Will drill three  $\frac{3}{4}$ -inch holes at once or the equivalent.

Weight,                      pounds.

Price, 4 spindles . . . . .	\$
“ per spindle, extra . . . . .	

*Pratt & Whitney Upright Gang Drill.*



*Pratt & Whitney Gang Drills.*

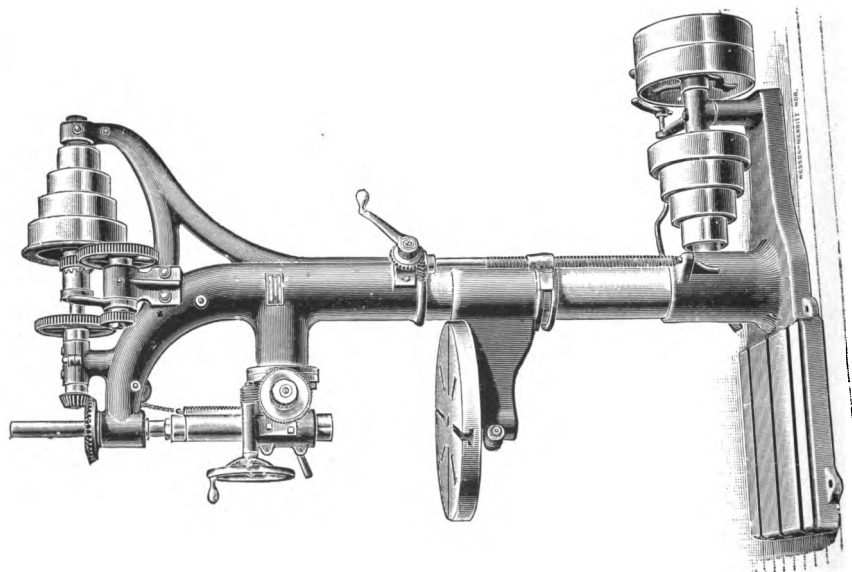
THESE Drills have lately been greatly improved. Change of position of driving pulleys make the driving belts amply long and the open head renders them easy to get at. Adjustment of idler pulley shaft gives command of the tension of main driving belt. The table is counterbalanced by weight, having vertical motion, and therefore uniform counterbalance, while varying weights of work on table can be sustained by extra weights provided for that purpose on the main weight.

**DETAILS AND PRICES.**

No.	No. spindles.	Diameter of spindles.	Size hole adapted to bore.	Distances Between			Weight with countershaft.	Price with countershaft.
				Table and spindle.	Centres of spindles.	Centre of spindle and column.		
1	2	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	2 to 16 in.	5	$5\frac{1}{2}$	680	
1	3	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	2 to 16 in.	5	$5\frac{1}{2}$	700	
1	4	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	2 to 16 in.	4	$5\frac{1}{2}$	740	
1	6	$\frac{3}{8}$ in.	$\frac{3}{8}$ in.	2 to 16 in.	$3\frac{1}{2}$	$5\frac{1}{2}$	800	
2	2	$1\frac{1}{8}$	$\frac{1}{2}$ in.	2 to 16 in.	$4\frac{3}{8}$	$6\frac{1}{2}$	1000	
2	3	$1\frac{1}{8}$	$\frac{1}{2}$ in.	2 to 16 in.	$4\frac{3}{8}$	$6\frac{1}{2}$	1025	
2	4	$1\frac{1}{8}$	$\frac{1}{2}$ in.	2 to 16 in.	$4\frac{3}{8}$	$6\frac{1}{2}$	1050	
2	6	$1\frac{1}{8}$	$\frac{1}{2}$ in.	2 to 16 in.	$4\frac{1}{2}$	$6\frac{1}{2}$	1150	
3	2	$1\frac{1}{4}$	$\frac{5}{8}$ in.	$2\frac{1}{2}$ to 16 in.	$4\frac{3}{8}$	$7\frac{3}{4}$	1325	
3	3	$1\frac{1}{4}$	$\frac{5}{8}$ in.	$2\frac{1}{2}$ to 16 in.	$4\frac{3}{8}$	$7\frac{3}{4}$	1375	
3	4	$1\frac{1}{4}$	$\frac{5}{8}$ in.	$2\frac{1}{2}$ to 16 in.	$4\frac{3}{8}$	$7\frac{3}{4}$	1400	
3	6	$1\frac{1}{4}$	$\frac{5}{8}$ in.	$2\frac{1}{2}$ to 16 in.	$4\frac{1}{2}$	$7\frac{3}{4}$	1500	
4	2	$1\frac{1}{2}$	$\frac{3}{4}$ in.	$2\frac{1}{2}$ to 18 in.	$4\frac{1}{2}$	$8\frac{3}{8}$	1700	
4	3	$1\frac{1}{2}$	$\frac{3}{4}$ in.	$2\frac{1}{2}$ to 18 in.	$4\frac{1}{2}$	$8\frac{3}{8}$	1730	
4	4	$1\frac{1}{2}$	$\frac{3}{4}$ in.	$2\frac{1}{2}$ to 18 in.	$4\frac{1}{2}$	$8\frac{3}{8}$	1760	
4	6	$1\frac{1}{2}$	$\frac{3}{4}$ in.	$2\frac{1}{2}$ to 18 in.	$4\frac{1}{2}$	$8\frac{3}{8}$	1870	

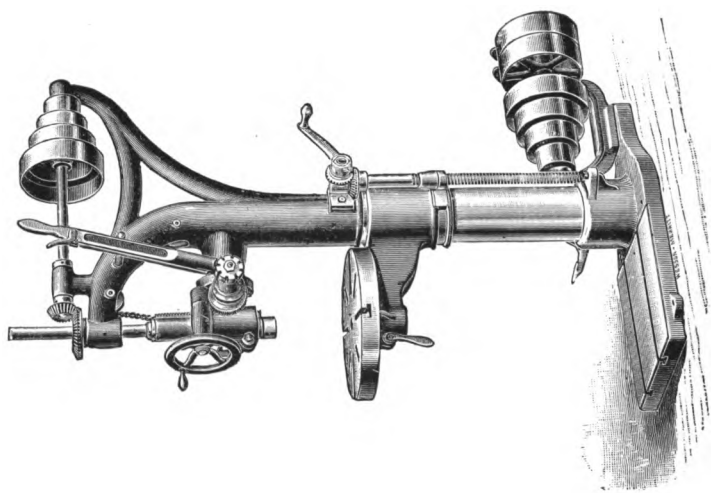
Distance between centres of spindles may be varied in building to order. The table saddles are adjusted vertically by means of rack, pinion and hand wheel. The spindle boxes are of steel, hardened and ground.

*Prentice 21 Inch Swing Upright Drill.*



*Prentice 20 Inch Swing Upright Drill.*

WITH COMBINED WHEEL AND LEVER FEED.





***Prentice 20 Inch Swing Upright Drill.******Stationary Head.***

**T**HIS machine has both wheel and lever feed. The spindle is counterbalanced and has a quick return motion. The base is provided with T slots. The table is elevated by a screw.

This machine will drill holes up to 1 inch in wrought metal. This machine can be furnished with power feed and an automatic trip or stop motion.

A countershaft, with friction pulleys, can be furnished, if the machine is desired for tapping purposes.

**SPECIFICATIONS.**

Distance from post to centre of table, 10 inches. Greatest distance from spindle to base plate, 41 inches. Greatest distance from spindle to table,  $25\frac{1}{2}$  inches. Vertical traverse of spindle, 8 inches. Diameter of spindle,  $1\frac{7}{8}$  inches. Hole in spindle fits Morse taper No. 3. Width of belt on cones,  $2\frac{1}{4}$  inches. Diameter of driving pulleys, 9 inches; face of driving pulleys,  $2\frac{3}{4}$  inches. Speed of lower shaft, 240 revolutions per minute. Floor space required, 44 inches by 15 inches. Total height of machine to top of cone, 5 feet 7 inches. Weight, 600 lbs.

Price, with wheel and lever feed, . . . . . \$

***Prentice 21 Inch Swing Upright Drill.******Stationary Head.***

**I**T has back gears and wheel feed. The table is vertically adjustable on the column by a screw and gearing and can be swung to one side, allowing the use of the base for placing work upon, when necessary. The spindle is operated by a worm and worm gear, in connection with a steel rack and pinion, and has the quick approach and return movement common to all our drills. This machine can be furnished with power feed and an automatic trip or stop motion. A countershaft, with friction pulleys, can be furnished, if the machine is desired for tapping purposes.

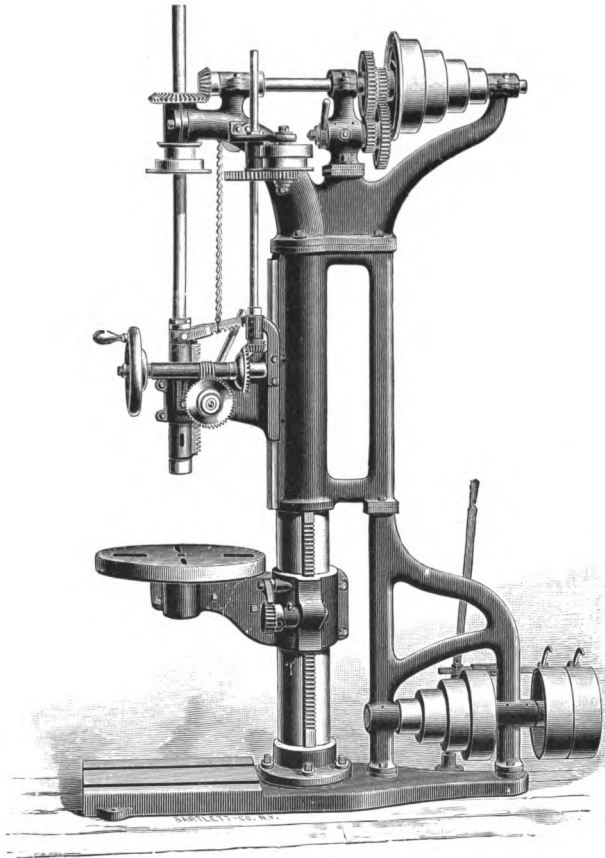
**SPECIFICATIONS.**

Diameter of table, 19 inches. Vertical traverse of table,  $16\frac{1}{2}$  inches. Distance from post to centre of spindle,  $10\frac{1}{2}$  inches. Vertical traverse of spindle, 8 inches. Diameter of spindle,  $1\frac{1}{2}$  inches. Hole in spindle fits Morse taper No. 3. Maximum distance from spindle to table, 25 inches. Maximum distance from spindle to base plate, 44 inches. Width of belt on cones,  $2\frac{1}{2}$  inches. Diameter of driving pulleys,  $11\frac{1}{2}$  inches by 3-inch face. Speed of lower shaft, 240 revolutions per minute. Floor space required, 54 inches by 22 inches. Total height of drill, 78 inches. Weight, 850 lbs.

Price, with back gear, . . . . . \$

## *Prentice 20 Inch Upright Drill.*

NEW PATTERN.



This new style 20-inch Upright Drill has a sliding head, back gears, and power feed.

*Price and description of this machine on opposite page.*

## **20 Inch Swing Upright Drill.**

**With Sliding Head.**

*Manufactured by Prentice Brothers.*

---

**C**UT on opposite page represents the 20-inch Swing Vertical Drill with back gears and self feed, counterbalanced spindle, with quick return movement. This drill is made with three or four section cones as desired; the three-section cone carrying a 3-inch belt for heavier drilling, and the four-section carrying a  $2\frac{3}{8}$ -inch belt. For medium drilling we always send the four-section cone unless otherwise ordered, it being amply wide for all ordinary work.

Greatest distance from spindle to base plate, 48 inches. Diameter of spindle,  $1\frac{9}{16}$  inches. Width of belt on drill,  $2\frac{1}{4}$  inches. Hole in spindle to fit Morse taper socket No. 3. Driving pulley, 10 inches diameter, 3 inches face. Speed of lower shaft, 240 revolutions per minute. Diameter of table, 18 inches. Floor space required, 4 feet 6 inches  $\times$  1 foot 7 inches.

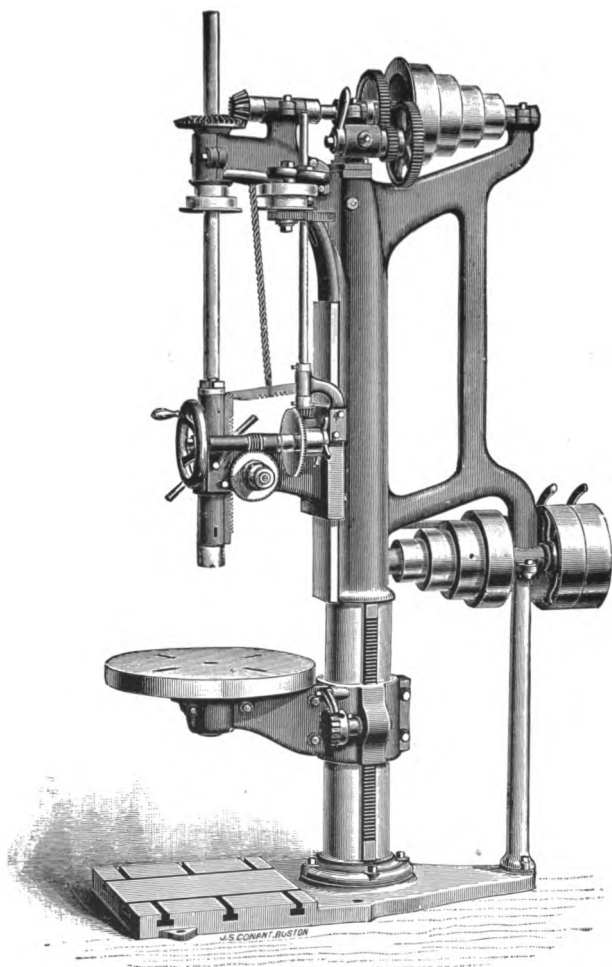
**Weight, 1,000 pounds.**

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**Price . . . . . \$**

## *Prentice 25 Incb Upright Drill.*

WITH BACK GEARS AND POWER FEED.



*Price and description of this machine on opposite page.*

## **25 Inch Swing Upright Drill.**

*Manufactured by Prentice Brothers.*

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OPPOSITE cut represents the 25-inch Swing Upright Drill, with back gears and self feed.

Distance from post to centre of table,  $12\frac{3}{4}$  inches. Distance from end of spindle, when at its greatest height, to base plate, 54 inches. Diameter of spindle in quill bearings,  $1\frac{5}{8}$  inches. Diameter of table, 22 inches. Diameter of pulleys, 11 inches, 3 inches face. Width of belt on cones,  $2\frac{3}{4}$  inches. Speed of lower shaft, 275 revolutions per minute. Floor space required, 4 feet 6 inches  $\times$  2 feet.

**Weight, 1,600 pounds.**

**Price, with back gears and self feed . . . . \$**

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## **32 Inch Swing Upright Drill.**

*SAME STYLE AS 25 INCH.*

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DISTANCE from end of spindle, when at its greatest height, to base plate, 57 inches. Diameter of spindle in quill bearings,  $1\frac{7}{8}$  inches. Diameter of table, 28 inches. Diameter of pulleys, 14 inches,  $3\frac{1}{2}$  inches face. Width of belt on cones,  $2\frac{3}{4}$  inches. Speed of lower shaft, 210 revolutions per minute. Floor space required, 5 feet 6 inches  $\times$   $2\frac{1}{2}$  feet.

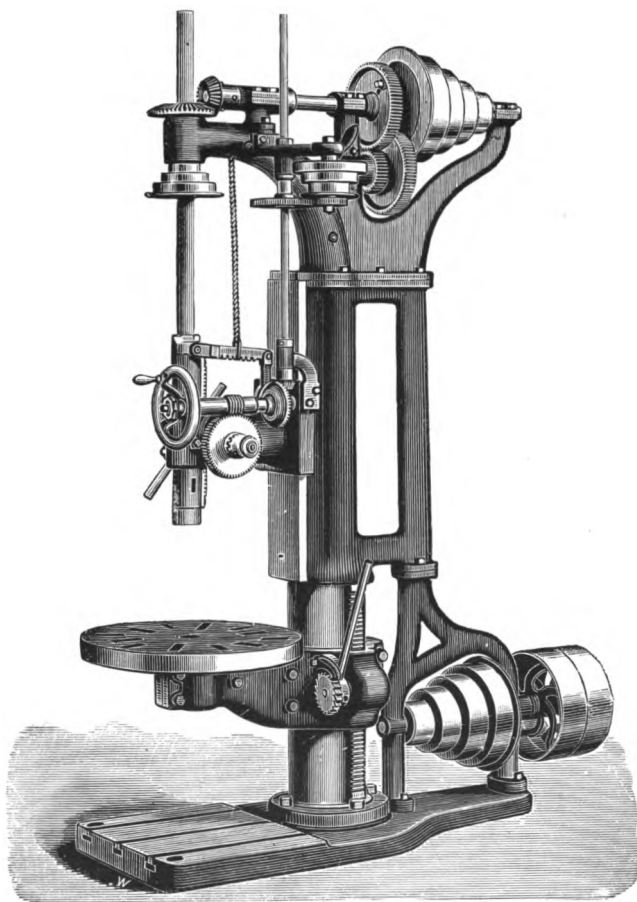
**Weight, 2,200 pounds.**

**Price, with back gears and self feed . . . . \$**

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## *Prentice 22 Inch Upright Drill.*

WITH BACK GEARS AND POWER FEED.



*Price and description of this machine on opposite page.*

## *Upright Drilling Machines.*

*Manufactured by Prentice Brothers.*

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**T**HE cut on opposite page represents Prentice Brothers' 22, 24, and 26 inch Upright Drills, with back gear and self feed, all of which are constructed of same general design.

### *SPECIFICATIONS 22-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $1\frac{3}{8}$  inches. Hole in spindle fits Morse taper socket No. 3. Diameter of table, 20 inches. Diameter of driving pulleys, 12 inches. Face of driving pulleys, 3 inches. Width of belt on cones,  $2\frac{1}{2}$  inches. Greatest distance from spindle to base plate, 50 inches. Speed of lower shaft, 275 revolutions per minute.

**Weight, 1,225 pounds.**

**Price . . . . . \$**

### *SPECIFICATIONS 24-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $1\frac{1}{8}$  inches. Hole in spindle fits Morse taper socket No. 3. Diameter of table, 22 inches. Diameter of driving pulleys, 12 inches. Face of driving pulleys, 3 inches. Width of belt on cones,  $2\frac{3}{4}$  inches. Greatest distance from spindle to base plate, 54 inches. Speed of lower shaft, 275 revolutions per minute.

**Weight, 1,600 pounds.**

**Price . . . . . \$**

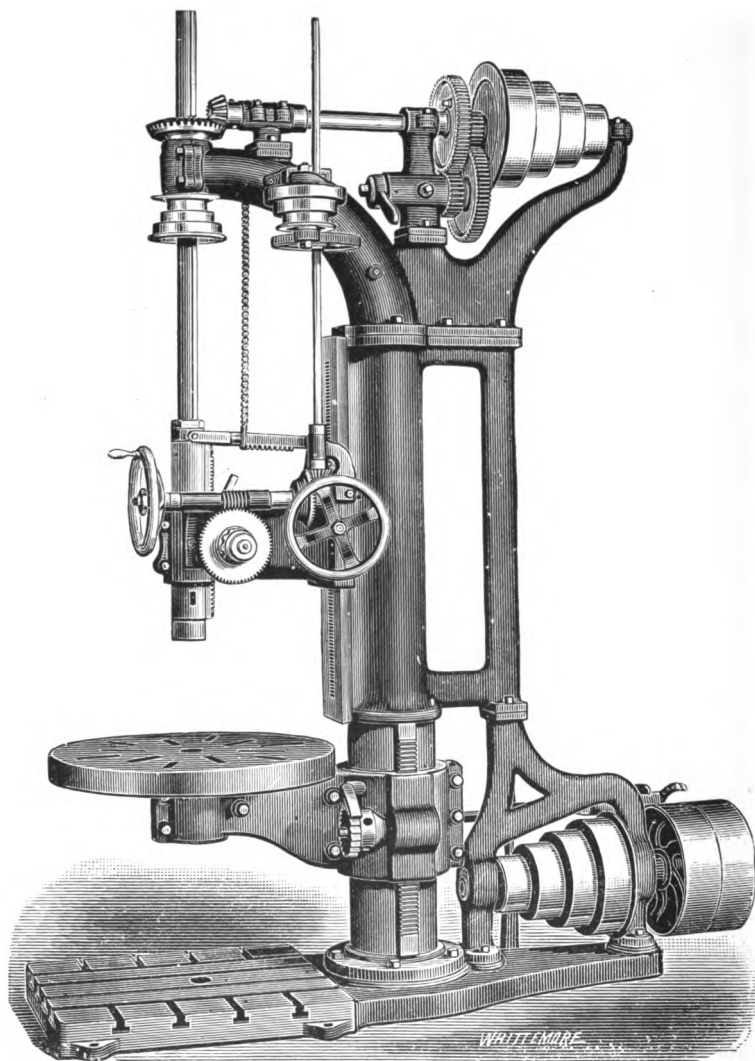
### *SPECIFICATIONS 26-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $1\frac{3}{8}$  inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 22 inches. Diameter of driving pulleys, 14 inches. Face of driving pulleys,  $3\frac{1}{2}$  inches. Width of belt on cones,  $2\frac{3}{4}$  inches. Greatest distance from spindle to base plate, 57 inches. Speed of lower shaft, 210 revolutions per minute.

**Weight, 2,100 pounds.**

**Price . . . . . \$**

*Prentice 30 Inch Upright Drill.*



*Price and description of this machine on opposite page.*



## ***Upright Drilling Machines.***

*Manufactured by Prentice Brothers.*

**T**HE cut on opposite page represents Prentice Brothers' 30, 34, and 36 inch Upright Drills, with back gears and power feed, all of which are constructed of same general design.

### ***SPECIFICATIONS 30-INCH SWING UPRIGHT DRILL.***

Diameter of spindle, 2 inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 26 inches. Diameter of driving pulleys, 14 inches. Face of driving pulleys, 4 inches. Width of belt on cones, 3 inches. Greatest distance from spindle to base plate, 59 inches. Speed of lower shaft, 200 revolutions per minute.

**Weight, 2,600 pounds.**

**Price . . . . . \$**

### ***SPECIFICATIONS 34-INCH SWING UPRIGHT DRILL.***

Diameter of spindle, 2 inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 30 inches. Diameter of driving pulleys, 14 inches. Face of driving pulleys, 4 inches. Width of belt on cones, 3 inches. Greatest distance from spindle to base plate, 59 inches. Speed of lower shaft, 200 revolutions per minute.

**Weight, 3,000 pounds.**

**Price . . . . . \$**

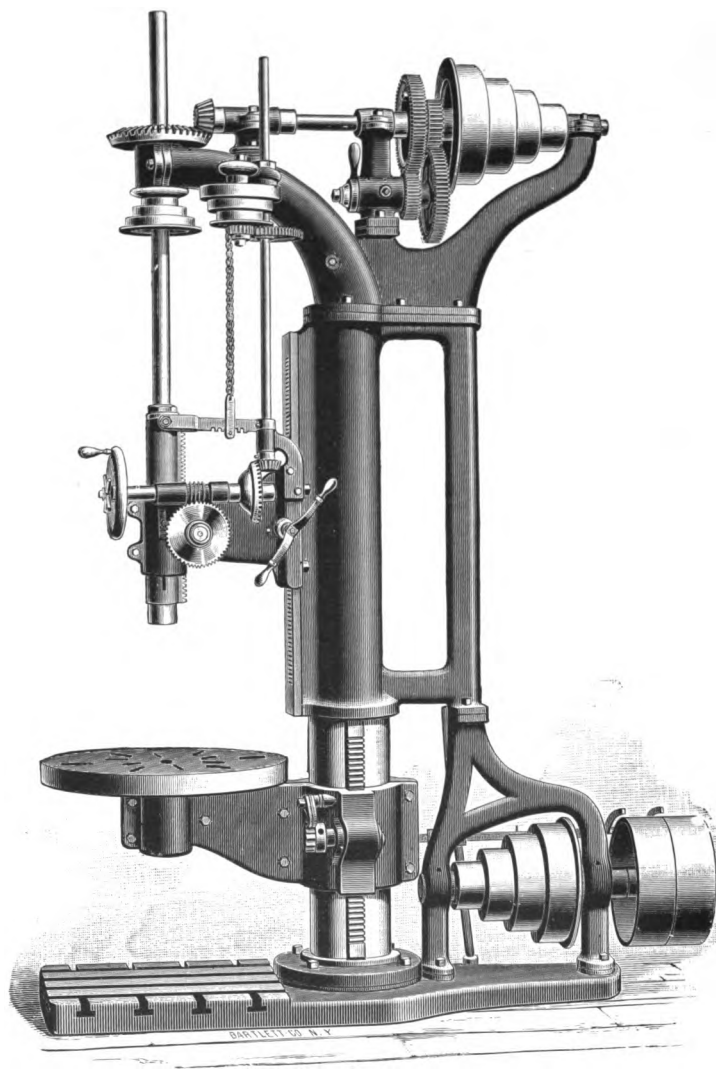
### ***SPECIFICATIONS 36-INCH SWING UPRIGHT DRILL.***

Diameter of spindle, 2¼ inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 32 inches. Diameter of driving pulleys, 16 inches. Face of driving pulleys, 4½ inches. Width of belt on cones, 3¾ inches. Greatest distance from spindle to base plate, 62 inches. Speed of lower shaft, 150 revolutions per minute.

**Weight, 4,000 pounds.**

**Price . . . . . \$**

*Prentice 42 Inch Upright Drill.*



*Price and description of this machine on opposite page.*

## *Upright Drilling Machines.*

*Manufactured by Prentice Brothers.*

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**T**HE cut on opposite page represents Prentice Brothers' 42, 46, and 50 inch Upright Drills, all of which are constructed of same general design.

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### *SPECIFICATIONS 42-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $2\frac{1}{4}$  inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 38 inches. Diameter of driving pulleys, 16 inches. Face of driving pulleys,  $4\frac{1}{2}$  inches. Width of belt on cones,  $3\frac{3}{4}$  inches. Greatest distance from spindle to base plate, 62 inches. Speed of lower shaft, 150 revolutions per minute.

**Weight, 4,500 pounds.**

**Price . . . . . \$**

---

### *SPECIFICATIONS 46-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $2\frac{1}{4}$  inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 42 inches. Diameter of driving pulleys, 18 inches. Face of driving pulleys,  $4\frac{1}{2}$  inches. Width of belt on cones,  $3\frac{3}{4}$  inches. Greatest distance from spindle to base plate, 62 inches. Speed of lower shaft, 150 revolutions per minute.

**Weight, 5,100 pounds.**

**Price . . . . . \$**

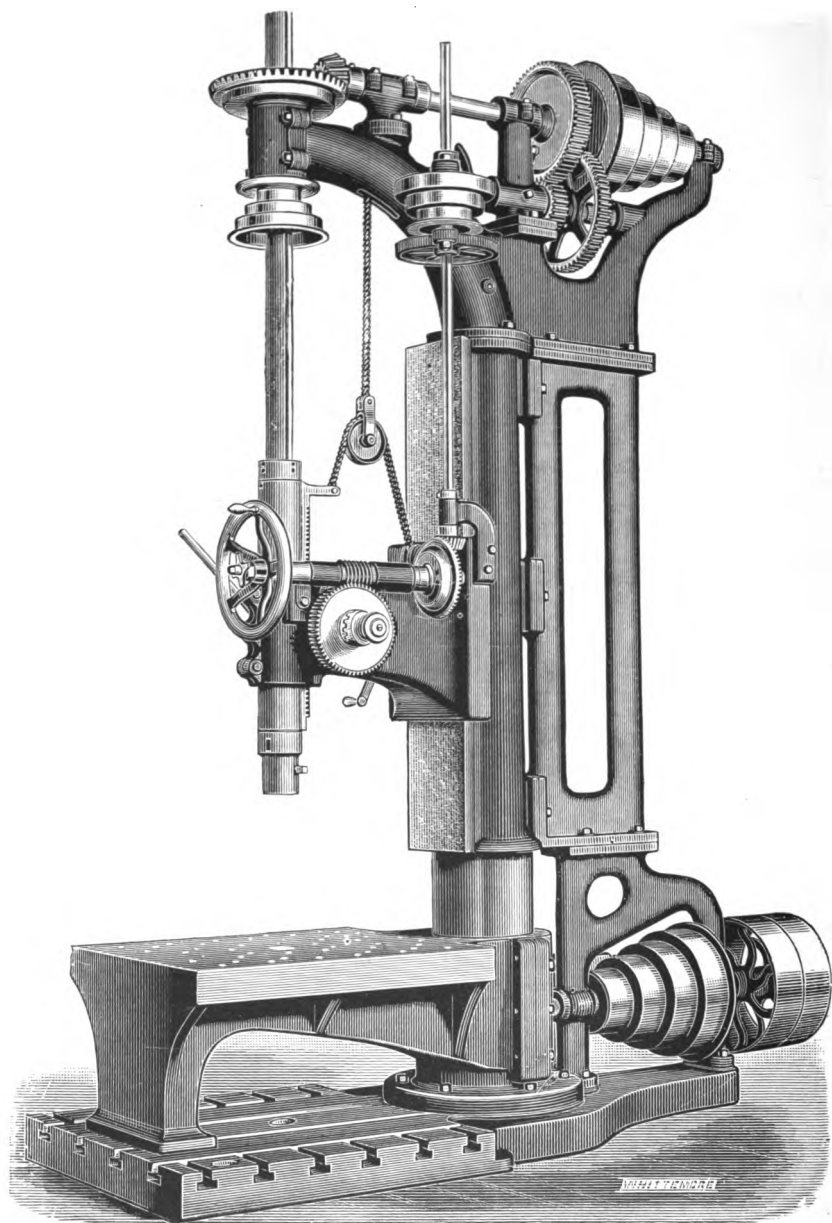
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### *SPECIFICATIONS 50-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $2\frac{1}{4}$  inches. Hole in spindle fits Morse taper socket No. 4. Diameter of table, 46 inches. Diameter of driving pulleys, 18 inches. Face of driving pulleys,  $4\frac{1}{2}$  inches. Width of belt on cones,  $3\frac{3}{4}$  inches. Greatest distance from spindle to base plate, 62 inches. Speed of lower shaft, 150 revolutions per minute.

**Weight, 5,600 pounds.**

**Price . . . . . \$**



## *Upright Drilling Machines.*

*Manufactured by Prentice Brothers.*

**T**HE cut on opposite page represents a 45 and 50 inch Upright Drill, made heavier in all its parts than our regular drill of same swing, intended for heavy bridge and locomotive work. The head and spindle are counterbalanced by one chain and weight, thus enabling the operator to loosen either or both at the same time without danger of falling. Each machine is provided with quick return movement. The table, instead of being round, extends directly from the column to the front, making a large and perfectly level surface to place heavy work upon. It is supported by a pedestal with a broad foot resting on the base plate.

The table swings on the column, and is provided with a taper pin to bring it central with the spindle. The base plate is planed perfectly level, and is provided with T-slots to fasten work upon. The feed cones have three changes, carrying a  $1\frac{1}{2}$ -inch belt. To make greater change in feed, the spur gear on feed cone can be removed, and larger or smaller gears put on to obtain any required speed of feed necessary.

### *SPECIFICATIONS 45-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $2\frac{3}{4}$  inches. Hole in spindle to fit Morse taper No. 5. Size of table,  $38 \times 30$  inches. Diameter of driving pulleys, 18 inches. Width of face of driving pulleys, 5 inches. Width of belt on cones, 4 inches. Greatest distance from spindle to base plate, 66 inches. Speed of lower shaft, 125 revolutions per minute. Height of drill, 11 feet 6 inches.

**Weight, 9,000 pounds.**

**Price . . . . . \$**

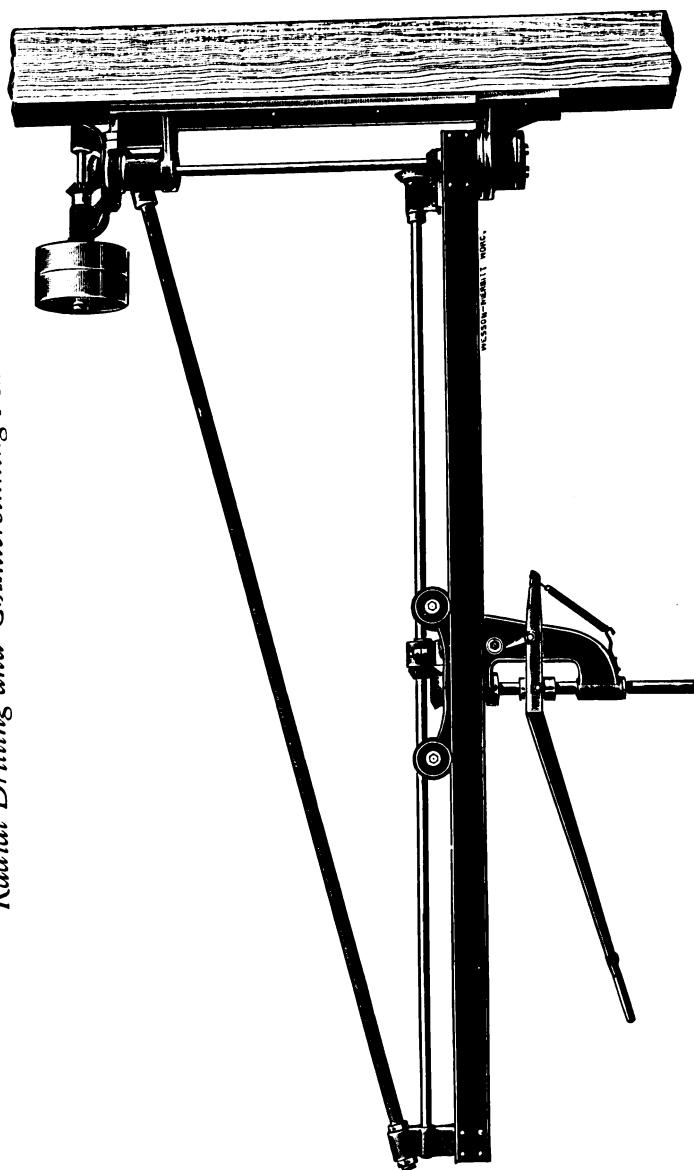
### *SPECIFICATIONS 50-INCH SWING UPRIGHT DRILL.*

Diameter of spindle,  $2\frac{3}{4}$  inches. Hole in spindle to fit Morse taper No. 5. Size of table,  $40 \times 32$  inches. Diameter of driving pulleys, 18 inches. Width of face of driving pulleys, 5 inches. Width of belt on cones, 4 inches. Greatest distance from spindle to base plate, 66 inches. Speed of lower shaft, 125 revolutions per minute. Height of drill, 11 feet 6 inches.

**Weight, 9,500 pounds.**

**Price . . . . . \$**

*Radial Drilling and Countersinking Machine.*



*For description and price see opposite page.*

## *Radial Countersinking Machine.*

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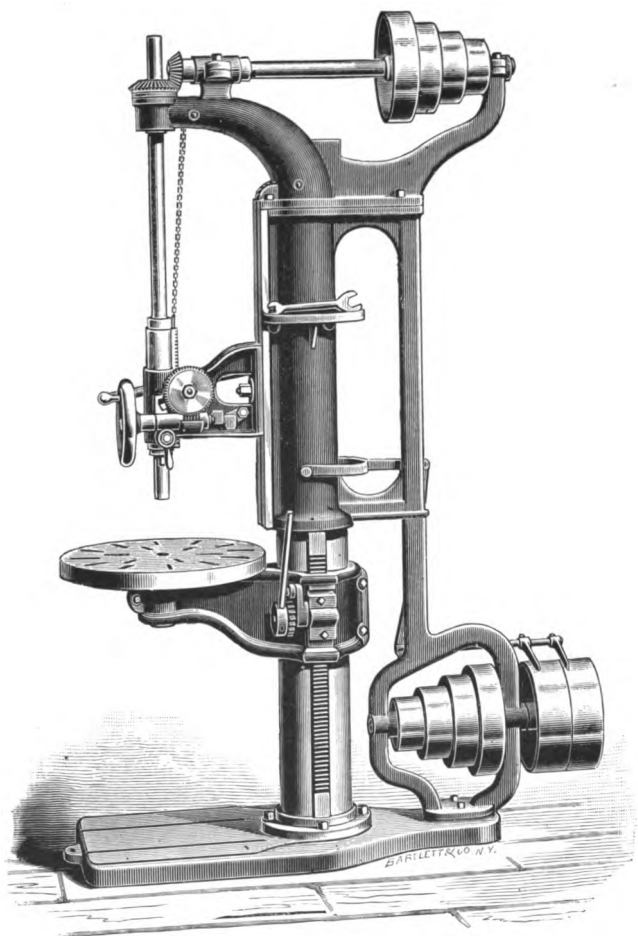
**C**UT on opposite page represents our Radial Countersinking Machine. It is intended for drilling and countersinking large steel plates, which can be laid upon a bench or upon the floor underneath the machine. The machine is bolted to a post, at a convenient distance from the floor, for the operator to pass under. The position of the spindle is quickly changed by the operator, either by moving it along upon the radial arm, or by swinging the arm to the required position. The feed is by a long hand lever, and is counterbalanced by a spiral spring. The driving shaft is adjustable for the purpose of belting the machine at either side of the post, or in position shown by cut. This machine will drill to the center of a circle of 30 feet.

**Extreme length of machine, 15 feet, 6 inches. Maximum distance from post to spindle, 14 feet. Minimum distance from post to spindle, 3 feet. Maximum distance from under side of radial arm to end of spindle, 40 inches. Minimum distance from under side of radial arm to end of spindle, 33 inches. Vertical traverse of spindle, 7 inches. Diameter of spindle,  $2\frac{3}{8}$  inches. Traverse of head on radial arm, 11 feet. Length of wall plate, 6 feet, 10 inches. Width of wall plate, 14 inches. Tight and loose pulleys on driving shaft, 16 inches in diameter by 6 inch face. Speed of countershaft, 120 revolutions per minute. Weight, 2,550 pounds.**

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**Price . . . . . \$**

*Blaisdell 20 Inch Swing Upright Drill.*



*For description and price see opposite page.*



## ***Upright Drilling Machines.***

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*Made by P. Blaisdell & Co.*

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**U**PRIGHT Drill No. 1, swings 20 inches.

Has movable head. Speed of countershaft, 325 revolutions per minute. Tight and loose pulleys, 8 inches diameter, 2½ inches face.

**Weight, 950 pounds.**

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**Price, without back gears or power feed . . . \$**

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**U**PRIGHT Drill No. 1½, swings 23 inches.

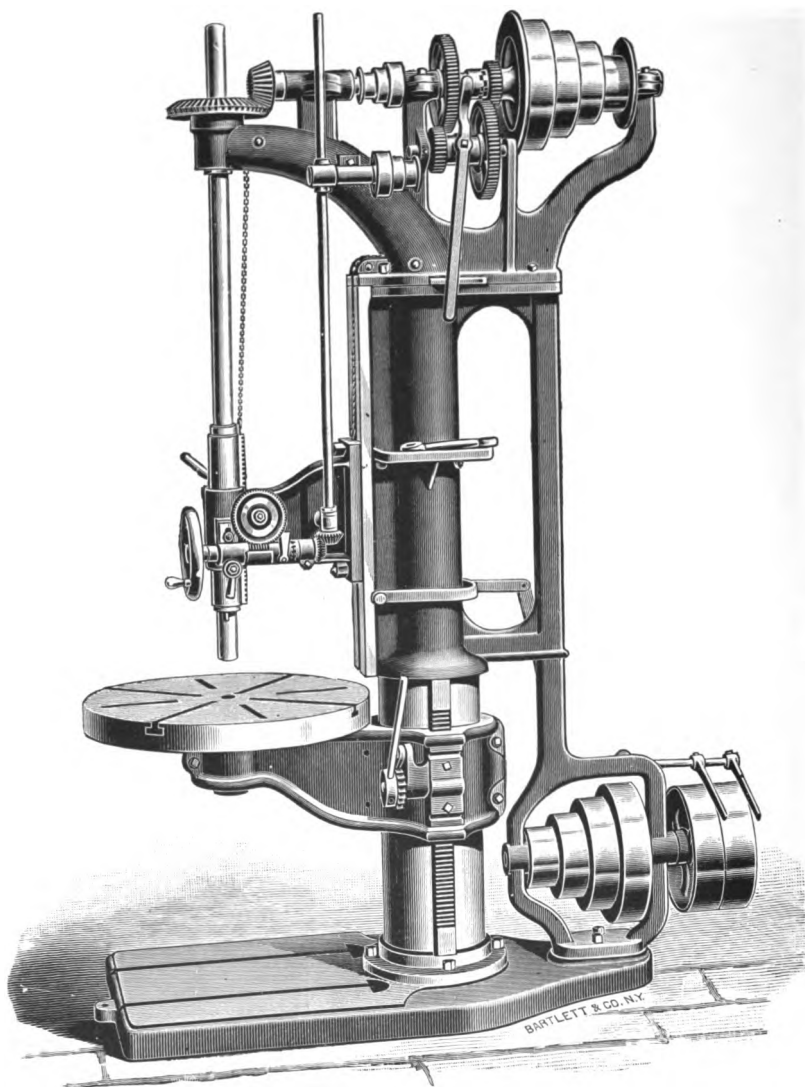
Distance from base to end of spindle at highest point, 48 inches.  
Distance from table to end of spindle, 35 inches. Speed of countershaft, 275 revolutions per minute. Tight and loose pulleys, 10 inches diameter, 2½ inches face.

**Weight 1,425 pounds.**

---

**Price, without back gears or power feed . . . \$**

*Blaisdell 28 Inch Swing Upright Drill.*



*For description and price see opposite page.*

## ***Upright Drilling Machines.***

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*Built for us by P. Blaisdell & Co.*

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### **U**PRIGHT Drill No. 2, swings 25 inches.

Distance from base to end of spindle, 50 inches. Distance from table to end of spindle, 37 inches. Speed of countershaft, 260 revolutions per minute. Tight and loose pulleys, 11 inches diameter, 3 inches face.

**Weight, complete, 1,800 pounds.**

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**Price, without back gears or power feed . . . \$**

**" with back gears and power feed . . .**

---

### **U**PRIGHT Drill No. 2½, swings 28 inches.

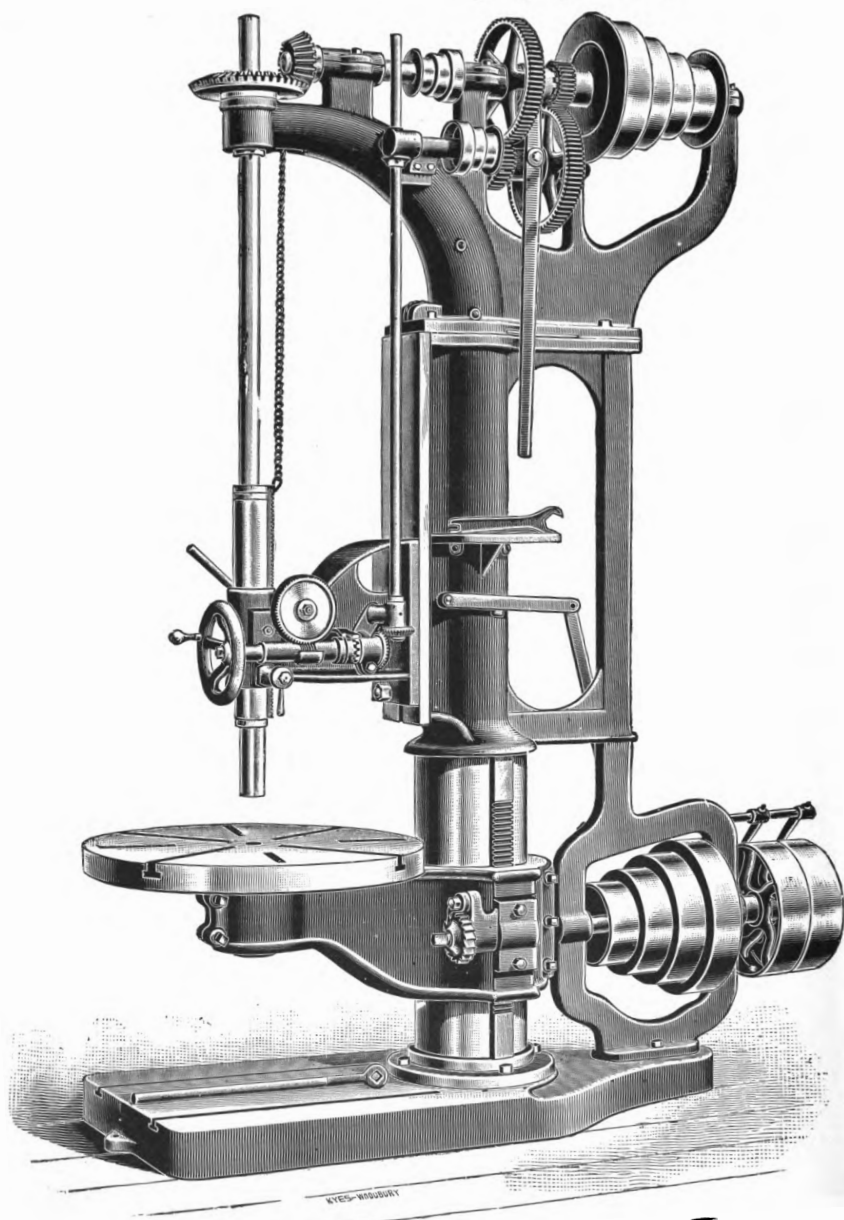
Greatest distance from base to end of spindle, 54 inches. Greatest distance from table to end of spindle, 37 inches. Speed of countershaft, 260 revolutions per minute. Tight and loose pulleys, 12 inches diameter, 3 inches face.

**Weight, complete, 2,100 pounds.**

---

**Price, complete . . . . . \$**

*Blaisdell 34 Inch Swing Upright Drill.*



*For description and price see opposite page.*

## *Blaisdell Upright Drills.*

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### **U**PRIGHT Drill No. 4, swings 34 inches.

Greatest distance from base to end of spindle, 58 inches. Greatest distance from table to end of spindle, 40 inches. Speed of countershaft, 200 revolutions per minute. Tight and loose pulleys, 12 inches diameter, 4 inches face.

**Weight, complete, 3,500 pounds.**

**Price, complete . . . . . \$**

---

### **U**PRIGHT Drill No. 5, swings 45 inches.

Greatest distance from base to end of spindle, 59 inches. Greatest distance from table to end of spindle, 41 inches. Speed of countershaft, 200 revolutions per minute. Tight and loose pulleys, 12 inches diameter, 4 inches face.

**Weight, complete, 5,000 pounds.**

**Price, complete . . . . . \$**

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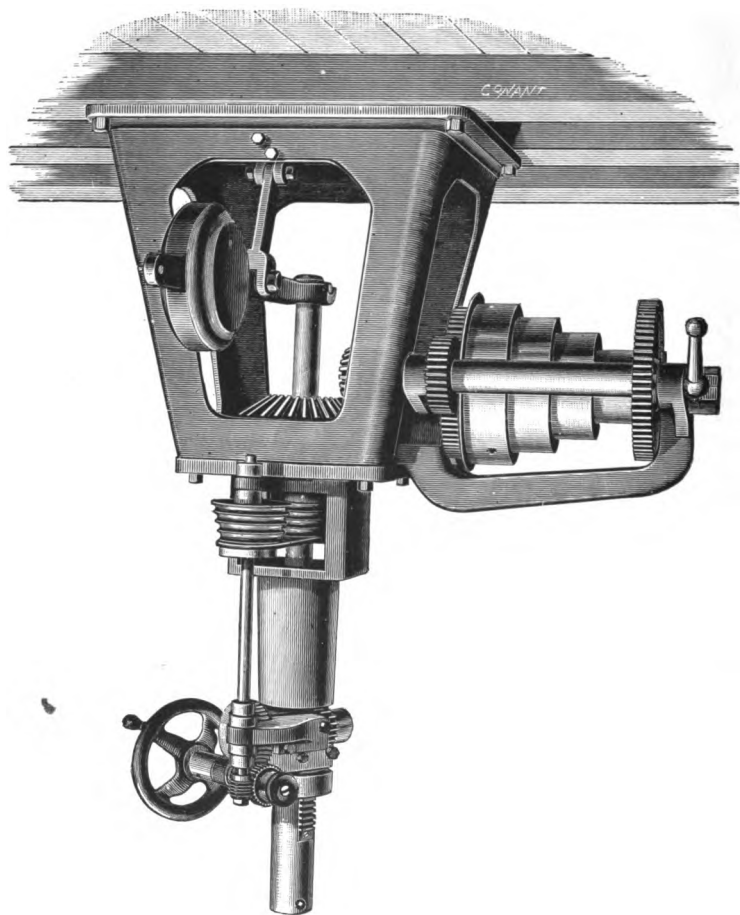
### **U**PRIGHT Drill No. 6, swings 50 inches.

Greatest distance from base to end of spindle, 59 inches. Greatest distance from table to end of spindle, 41 inches. Speed of countershaft, 200 revolutions per minute. Tight and loose pulleys, 12 inches diameter, 4 inches face.

**Weight, complete, 5,500 pounds.**

**Price, complete . . . . . \$**

*Gleason Suspension Drilling Machine.*



*Price and description of this machine on opposite page.*

### *Suspension Drilling Machine.*

*Built for us by William Gleason.*

---

**A**RRANGED to fasten to the ceiling, or to a frame-work overhead, this machine is specially adapted for drilling heavy frames or castings, and for boiler work. The body is heavy, cast in one piece. The spindle, which is balanced, is made of best steel,  $2\frac{1}{2}$  inches in diameter, and is driven by a cut bevel gear, 12 inches in diameter,  $2\frac{1}{2}$  inches face, 1 inch pitch; the driving pinion being 6 inches in diameter. The cone is  $13\frac{1}{2}$  inches in diameter; the faces,  $3\frac{1}{4}$  inches wide. It is back geared 6 to 1, and, with the bevel gears for the spindle 2 to 1, makes the cone revolve 12 revolutions to 1 of the spindle, this being sufficient for the heaviest work. The spindle has an automatic vertical feed of 20 inches. Speed of countershaft, 220 revolutions per minute. Tight and loose pulleys, 12 inches in diameter,  $4\frac{1}{2}$  inches face.

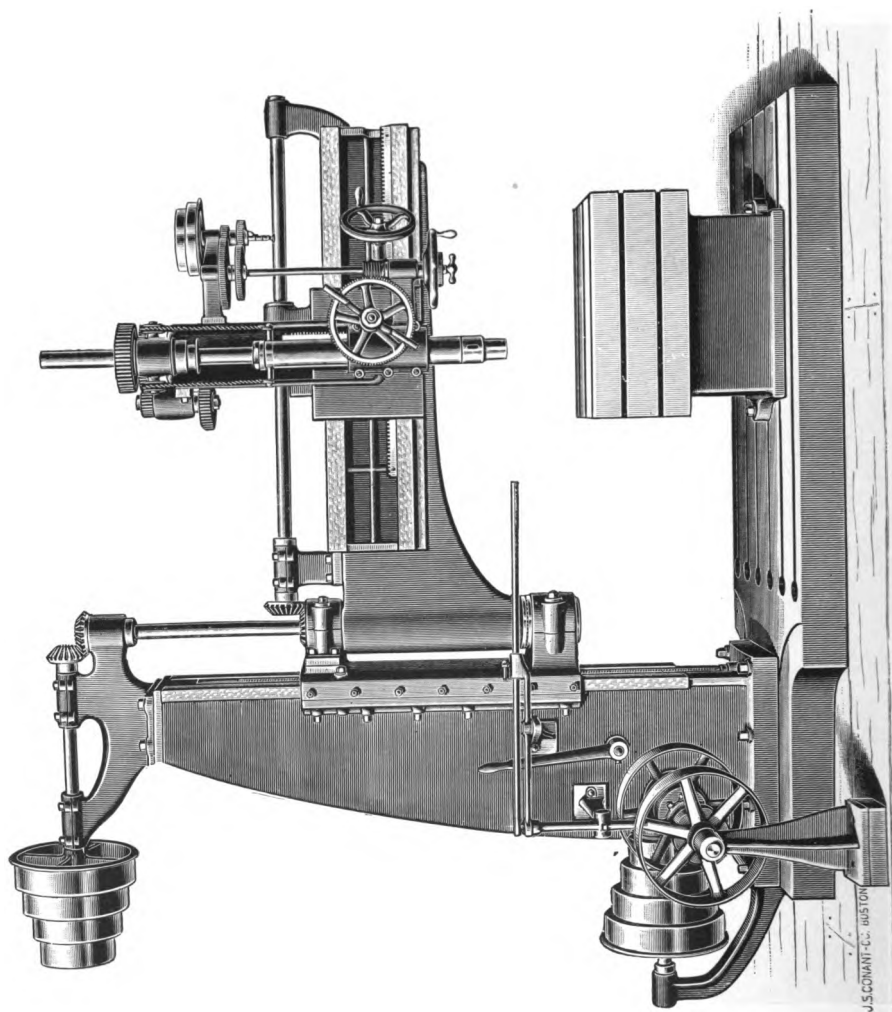
This machine is capable of drilling holes 2 inches in diameter, and can be used for boring out holes and cylinders up to 12 inches in diameter.

**Weight, complete, 1,600 pounds.**

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**Price, with countershaft . . . . . \$**

*No. 2 Radial Drilling Machine.*





## ***No. 2 Radial Drilling Machine.***

*Made by Prentice Bros.*

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**T**HE cut opposite represents a newly designed gear-driven radial drill. It is of first-class workmanship, extremely heavy and stiff.

Vertical traverse on column 36 inches. Movement of spindle 16 inches. Diameter of spindle  $2\frac{1}{2}$  inches. Six-foot arm will drill to center of 130 inches. Maximum distance from base to spindle 62 inches. Driving pulleys 16 x 4 inches. Weight 19,000 pounds.

Price. . . . . \$

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## ***No. 3 Radial Drilling Machine.***

*A Much Larger Size Than the Above.*

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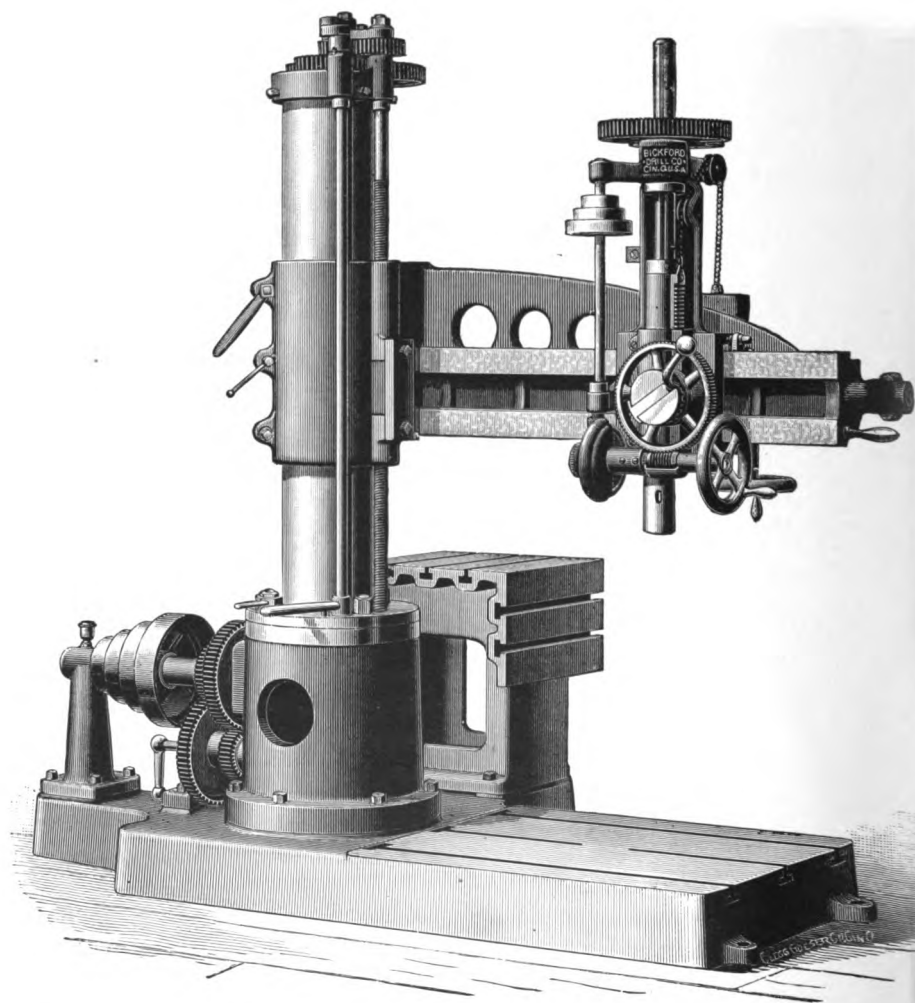
**T**RVERSE on column 53 inches. Traverse of spindle 20 inches. Diameter of spindle 4 inches. 7-foot arm drills to centre of 156 inches. Maximum distance from base to spindle 96 inches. Driving pulleys 24 x  $5\frac{1}{2}$  inches. Weight 34,000 pounds.

Price . . . . . \$

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The makers are now bringing out a No. 0 4-foot arm having about the power of a 30-inch drill, and a No. 1 of a power between No. 0. and No. 2.

*Bickford Radial Drill.*



**Bickford**  
**Radial and Universal Radial Drilling Machines.**

**T**HESE machines are most carefully studied for convenience, strength and durability, and every effort has been made to secure the best possible workmanship in every detail. Special attention is called to the Universal Machine illustrated on the next page, with both swivelling arm and swivelling head.

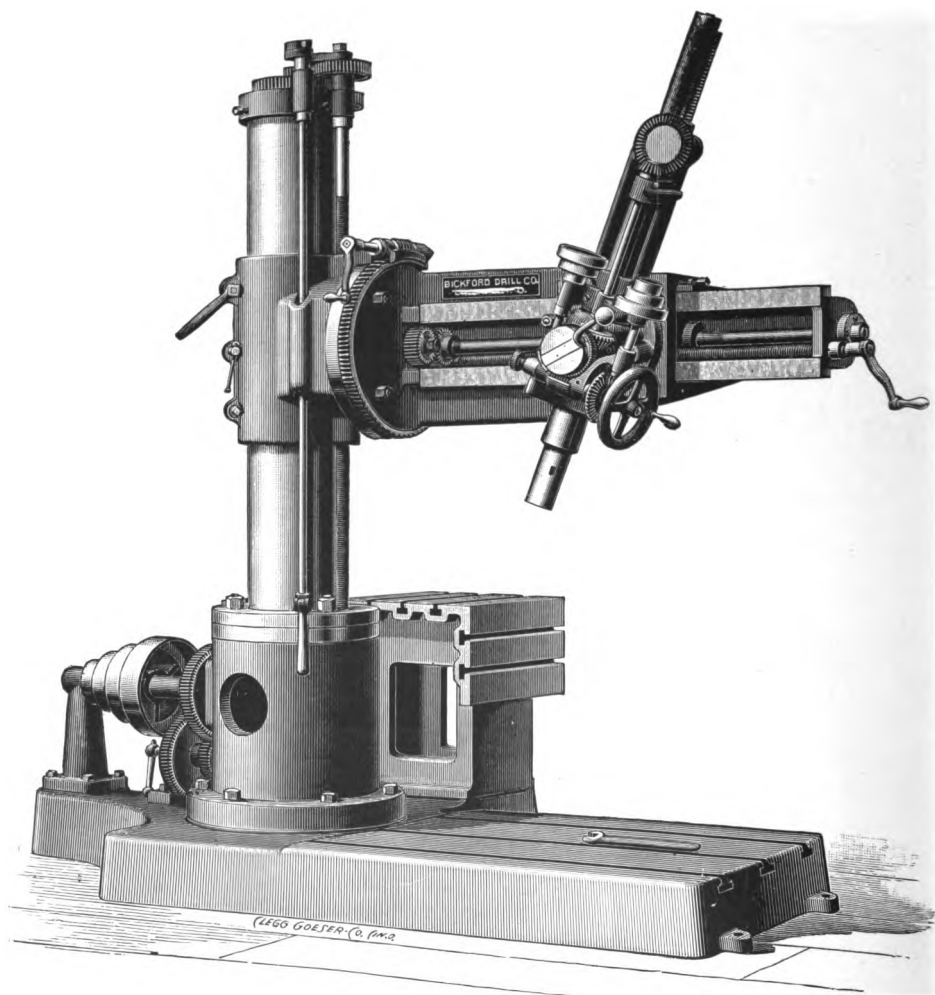
**BICKFORD RADIAL DRILLING MACHINE.**

Dimensions, Weights, Prices, Etc.	No. 1.	No. 2.	No. 3.
Diameter of column . . . . .	10 inches	11 inches.	14 inches.
Height of column . . . . .	7 ft. 3 in.	8 ft. 2 in.	10 feet.
Length of arm . . . . .	3 ft. 7 in.	4 ft. 6 in.	5 ft. 6 in.
Drills to centre of circle . . . .	7 ft. 2 in.	9 feet.	11 feet.
Will take under spindle . . . .	4 ft. 2½ in.	5 feet.	6 ft. 6 in.
Diameter of spindle . . . . .	1½ inches.	1½ inches.	2½ inches.
Size of hole in spindle, Morse sockets Nos. . . . .	4	5	5
Traverse of spindle . . . . .	15 inches.	20 inches.	20 inches.
Size of countershaft pulleys . . .	12 x 3 in.	14 x 3½ in.	16 x 3½ in.
Speed of countershaft pulleys . .	250 rev.	250 rev.	200 rev.
Weighs about . . . . .	4,500 lbs.	5,700 lbs.	9,500 lbs.
Prices . . . . .			

Machines are also made called Half Universal, in which the spindles swivel on the arm, as shown in the cut of the full Universal, page 248. They are called styles A and D. They have somewhat larger spindles, but otherwise differ but slightly from Nos. 2 and 3 above.

**Tapping Attachments.** The above drills are also supplied with what we believe is one of the best tapping attachments made. When an adjustable clamp strikes the reversing lever the tap is automatically backed out. Details of this attachment are of the highest class.

*Bickford Universal Radial Drill.*

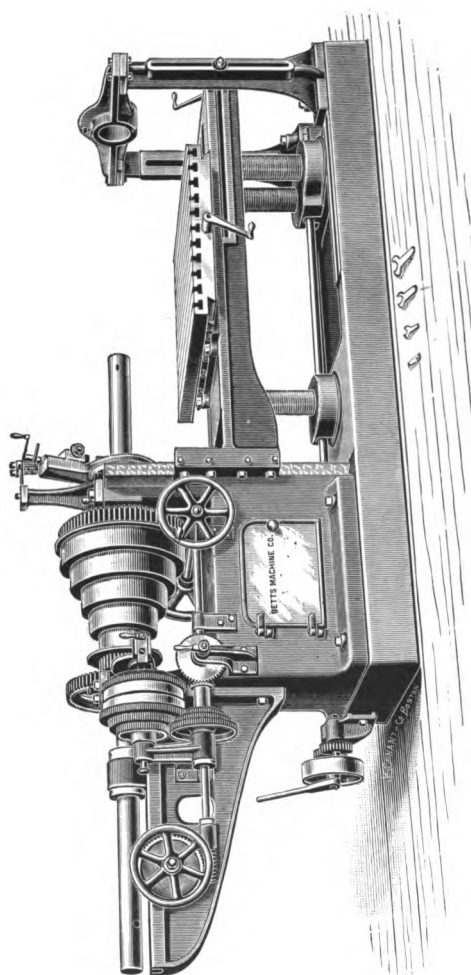


***Universal Radial Drills.****Made by the Bickford Drill Company.*

Dimensions, Weights, Prices, Etc.	Style B.	Style C.
Diameter of column . . . .	11 inches.	14 inches.
Height of column . . . .	8 feet 2 inches.	10 feet.
Length of arm . . . .	4½ feet.	5½ feet.
Drills to centre of circle, outside of column of . . . .	9 feet.	11 feet.
Greatest distance from floor to end of spindle . . . .	4 feet 10 inches.	6 feet 6 inches.
Total height of table from sole plate . . . . .	24 inches.	28 inches.
Size of top of table . . . .	20×20 inches.	28×28 inches.
Diameter of spindle . . . .	2½ inches.	2½ inches.
Size of hole in spindle, Morse socket No. . . . .	4	5
Traverse of spindle . . . .	16 inches.	20 inches.
Size of countershaft pulleys .	14×3½ inches.	16×3½ inches.
Speed of countershaft pulleys per minute . . . . .	250 revolutions.	200 revolutions.
Width of belts on cones . . .	3 inches.	3 inches.
Floor space required for base .	96×56 inches.	116×82 inches.
Weights about . . . . .	5,700 pounds.	9,500 pounds.
Prices . . . . .		

*Send for general descriptive catalogue.*

*Horizontal Boring and Drilling Machines.*



## Horizontal Boring and Drilling Machines.

**T**HESE Machines combine the advantages of the lathe and vertical drilling machines, and are almost indispensable where much heavy and long work is to be manipulated, such as cylinders, bearings for shafts, etc., etc., or where many holes are to be bored truly parallel.

The movements of the tables render adjustment of the work very easy and accurate. A circular revolving table can be added if desired. As illustrated opposite, facing arms with travelling tool blocks can be attached to the boring bars for facing one or both ends of the work accurately at right angles with the boring. The top of the steady rest is removable, so that long work can be placed on the table. The No. 2, the size mostly used, is now made with three screws for elevating the table, adding greatly to the steadiness and accuracy of the machine. See cut.

These tools are now made in three sizes.

**No. 1.** Spindle, 3 inches diameter, 24 inches traverse. Cross table, 24 x 36 inches, with longitudinal and cross adjustment, and will take 25½ inches under the spindle. Weight, 9,000 pounds.

Price, . . . . . \$

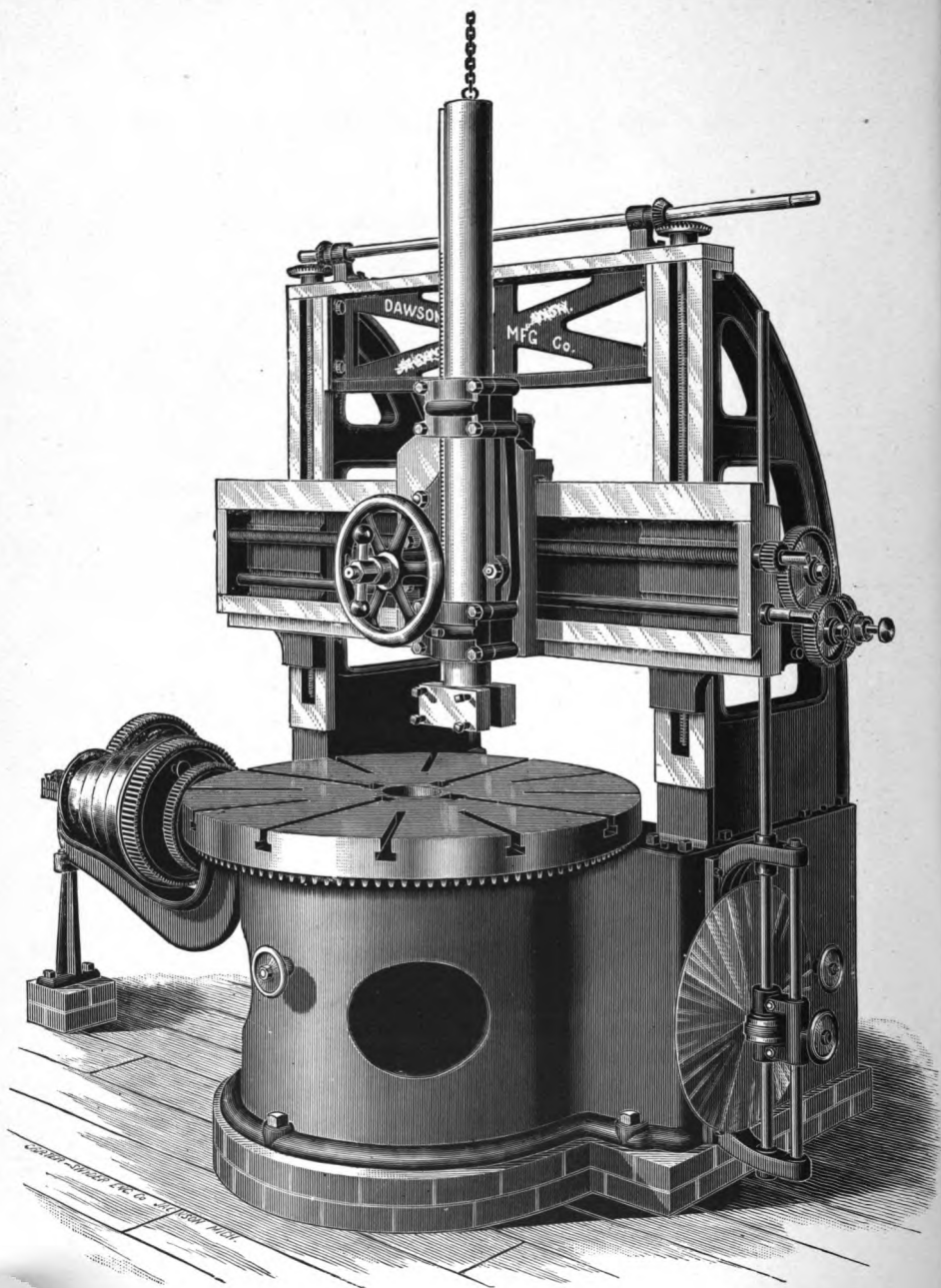
**No. 2.** Spindle, 4 inches diameter, 30 inches traverse. Cross table, 36 x 48 inches. Will take 26½ inches under spindle. Weight, 15,000 pounds.

Price, . . . . . \$

**No. 3.** Spindle, 5 inches diameter, 30 inches traverse. Cross table, 48 x 60 inches. Takes 27½ inches under the spindle. Weight, 29,000 pounds.

Price, . . . . . \$

In all these machines spindles can be fed in either direction, and with one setback will bore double their rated traverse. Tables all raise by power.





## *Burnham Vertical Boring Mill.*

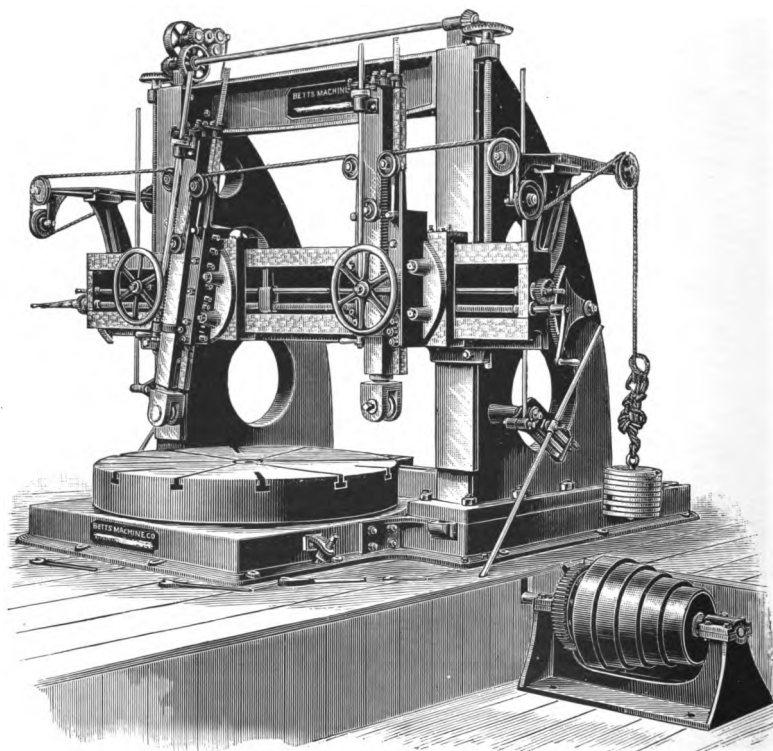
*Made by Dawson Manufacturing Co.*

**T**HIS Tool is especially designed for medium sized work, and will do all kinds of boring and turning within its range. It will bore and turn a pulley 43 inches diameter, 24 inches face. The main frame and housings are very stiff. The cross rail is extra heavy, and will not twist while doing very heavy work; has a balanced boring spindle, with self-continuous feed and quick return, up and down, in and out, at any angle; has a 4-speed cone for a  $3\frac{1}{2}$ -inch belt, heavy back-gear, making eight changes of speed. The face plate is 40 inches diameter and has an annular bearing near the outside edge, on which it runs while doing heavy work. The spindle runs on a steel step, and the table may be raised so as to turn solely upon the spindle. This can be very quickly accomplished and is a valuable provision for setting work, boring and turning smaller pieces, etc. The spindle is very long and has large and long bearing, and ample provision is made for taking up wear. The feeds are automatic in all directions—a disk driving a friction wheel operates them. The rapidity of the feed is regulated by moving the friction in or out of the surface of the disk, and by moving the friction wheel across the centre of the disk, the feed is reversed. This feed is very powerful and reliable, and capable of instantaneous change from the fastest to the slowest speeds. The tool holder is also of very convenient form to hold tools in any required position. The bar is exactly central with the spindle, permitting the use of a double cutter for boring. The position of the face plate makes it more convenient for chucking heavy work than a lathe and a shop having this class of work to do will find it preferable. *We furnish this machine with two heads when required.* This mill embodies the most advance practice in machine tool construction, ample weight being given to all parts and all sliding fits are made by scraping, and the workmanship throughout is of the best character.

Size of tight and loose pulleys 20 inch diameter, 4 inch face. Speed of countershaft, 120 revolutions. Shipping weight, 6,600 pounds.

Price, . . . . . \$  
 “ with two heads . . . . .

*Vertical Turning and Boring Mills*



### *Vertical Turning and Boring Mills.*

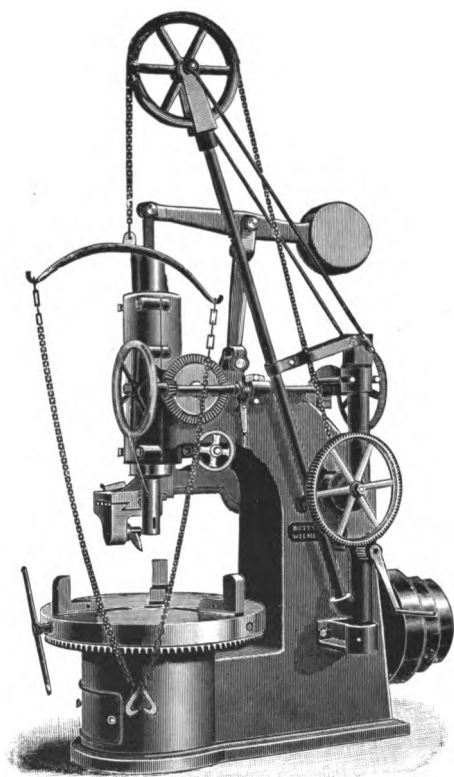
**F**OR all suitable heavy turning and boring work the advantage of these tools over the facing lathe is very great. One vertical spindle will move to the centre for boring, the other as near as required. Movements of each are entirely independent of the other. Cross head raises and lowers by power. Tables have an annular bearing near edge on which to run when on heavy work. Uprights made, when so ordered, to set back as shown in cut, so as to handle work larger than rated size of the machine. In this case proper provision is made by a blocking out piece for advancing one of the spindles to the centre of the work.

Slotting attachments are supplied when desired.

#### DETAILS AND PRICES.

	Weight.	Price.
5-foot mill . . . . .		
6 " " . . . . .		
7 " " . . . . .		
7 " " opening to 10 feet . . .		
8 " " . . . . .		
9 " " . . . . .		
10 " " . . . . .		
10 " " heavy . . . . .		
10 " " opening to 16 feet . . .		
12 " " . . . . .		
14 " " . . . . .		
14 " " heavy . . . . .		
14 " " opening to 20 feet . . .		

*Car Wheel Borer.*



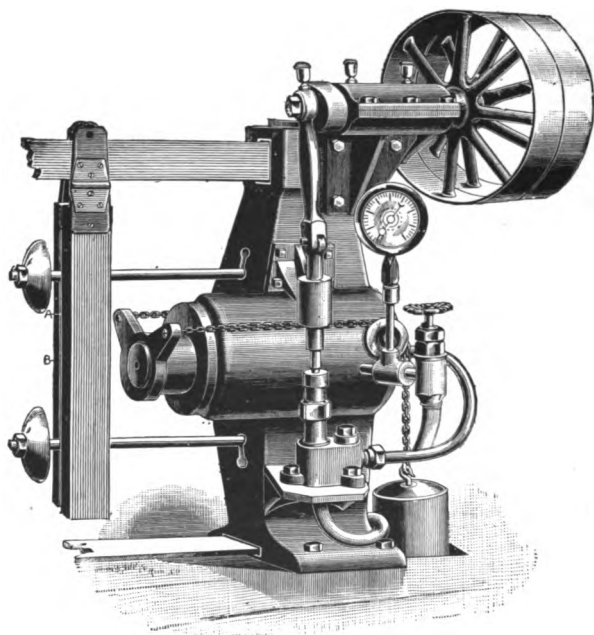
### ***Car Wheel Borers.***

#### ***Adapted Especially for Car Wheels.***

**T**HE frames are very heavy and stiff. The machines are fitted with Universal chucks with steel jaws of proper shape for holding wheels. They have adjustable power feed with counterbalanced spindles and quick return. They are provided with improved hub facing attachments with self-operating feed to face the hub at the same time the wheels are being bored. This is so arranged as to swing entirely out of the way when not wanted. They also have cranes for handling the wheels.

- 
- |  |                  |
|--|------------------|
| <b>No. 2 is for 36-inch wheels and less. Weight</b>        |                  |
| about 6,350 lbs. . . . .                                   | <b>Price, \$</b> |
| <b>" 4 also for 36-inch wheels and less, adapted</b>       |                  |
| to large works. Weight, 8,000 lbs. . . . .                 | <b>"</b>         |
| <b>" 6 for 42-inch wheels. Weight, 10,000 lbs. . . . .</b> | <b>"</b>         |

*Car Wheel Hydraulic Press*



### *Car Wheel Hydraulic Presses.*

*Made by Schaffer Manufacturing Co.*

---

**T**HESE Presses are fitted with standard gauges with special manner of packing cylinders, absolutely preventing leakage. Steel crank shafts in babbit boxes. Special Shaffer pumps, single or double. They have water tank and return weights, and hand working pumps, if desired. They are made in sizes from 24-inch to 48-inch wheels, and from 40 to 300 tons pressure.

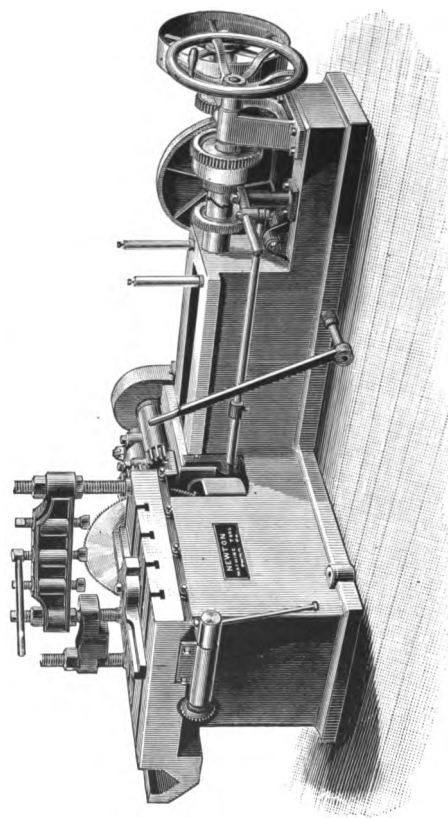
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Portable Hydraulic Presses from 100 to 175 tons pressure, for driving wheels, crank pins, shell liners to driving boxes, removing piston rods from head and other uses.

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*Prices on application.*

*No. 2 Cold Saw Cutting-off Machine.*





### *Newton Cold Saw Cutting-off Machines*

**T**HESE Machines will cut round, square, flat, or irregular shapes perfectly square or to any desired angle. They can also be used for face milling to the best of advantage. They have an automatic variable feed of  $\frac{1}{2}$  to 2 inches and automatic stop.

The machines are heavy and well built.

	0	1	2	3	4	5	6
Size saw . . . .	12½ in.	18¾ in.	24 in.	30 in.	36 in.	48 in.	
Cuts beams . . .	2½ x 10	4½ x 16	6 x 24	8 x 32	11 x 38	15 x 51	
Weight . . . .	2,500	4,500	7,500	9,500	14,000	20,000	
Size counter pulleys . . . .	12 in.	12 in.	20 in.	16 in.	20 in.	26 in.	
No. revolutions of counter pulleys	420	420	390	330	440	500	
Price . . . . .							

We can supply special machines varied from the above as to length or other details.

### *Cold Iron Band Saw Machines.*

**T**HESE Machines will work irregular forms, curves and other details which the rotary saw cannot reach. For example, such work as a slotter is applied to, and it is claimed much more rapidly than the latter.

No. 1 works to centre of 80 inches by 12 inches thick.

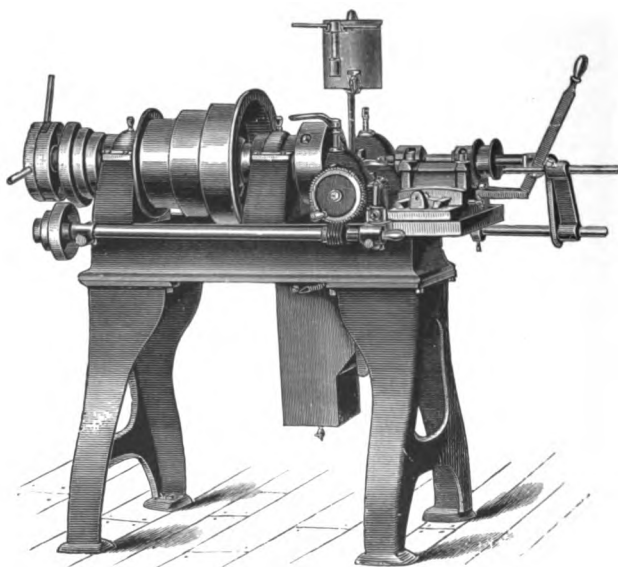
Price, . . . . . \$

No. 2 works to centre of 108 inches by 15 inches thick.

Price, . . . . . \$

## *Hurlbut Cutting-off and Centering Machines.*

THIS CUT REPRESENTS THE 2-INCH AND 3-INCH MACHINES.



*Prices and description of these machines on opposite page.*

## *Hurlbut's Cutting-off and Centering Machines.*

**T**H<sup>E</sup>SE machines have been designed with great care, to have them attractive in appearance, convenient to operate, and at the same time machines that can be sold at a price within the reach of small shops.

Special features of these machines are as follows:—

1. The two tools which will cut twice as fast as one, and will do the same amount of work with less strain upon the tools and upon the machine.

2. The patent nut, by which the back tool-block can be made independent at will, and the tools quickly adjusted to cut alike, even while running.

3. The dumping device for chips and oil, which consists of a hinged receptacle under the machine by which the oil is drained from chips—Chips can then be dumped dry.

This makes a neat, convenient, and economical arrangement. The chucks are made specially for this machine, and are guaranteed very strong and substantial.

The machine has automatic feed and an automatic stop for the tools.

The centering attachment runs with separate belt and countershaft, and makes the machine a perfect centering machine. One great advantage of centering on this machine is that the work can be revolved while centering, which is sure to bring centre true. This attachment is so constructed that it can be quickly adjusted to centre of machine in case the bearings ever wear.

Countershaft has tight and loose pulleys, or can be furnished with friction clutches, and two speeds, at a slight additional cost.

**2 Inch Machine** will cut off and centre rough shafts from  $\frac{1}{4}$  to 2 inches in diameter. Speed of countershaft, 100 revolutions per minute. Pulleys, 10 inches  $\times$  3 inches.

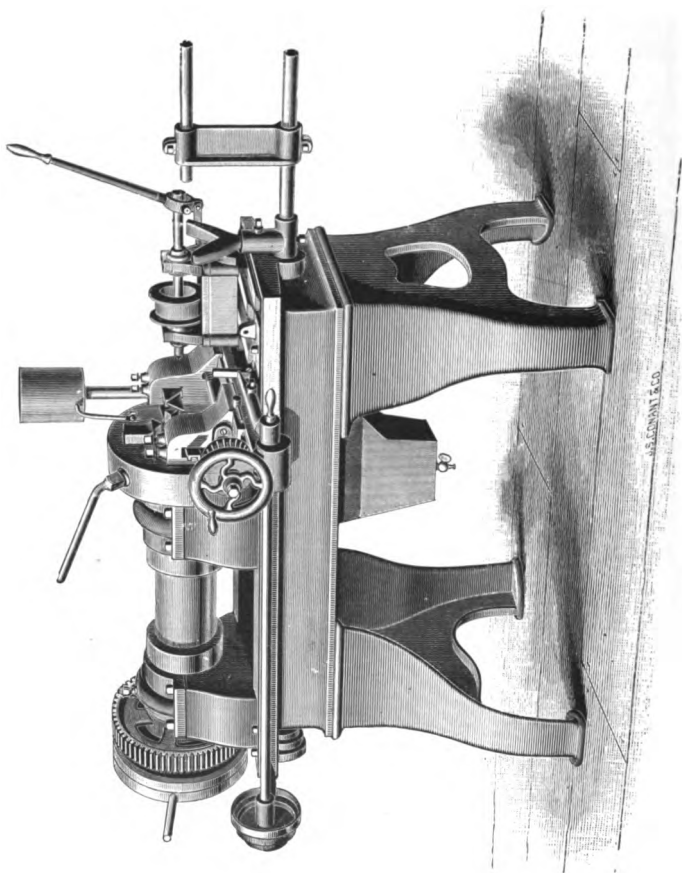
Price, F. O. B., Boston . . . . . \$

**3 Inch Machine** will cut off and centre rough shafts from  $\frac{3}{8}$  to 3 inches in diameter. Speeds of countershaft, 60 and 100 revolutions per minute. Pulleys, 14 inches  $\times$  4 inches.

Price, F. O. B., Boston . . . . . \$

## *Hurlbut's Cutting-off and Centering Machine.*

THIS CUT REPRESENTS THE 4-INCH AND 5-INCH MACHINES.



*Prices and description of these sizes on opposite page.*

## ***Hurlbut's Cutting-off and Centering Machines.*** **GEARED MACHINES.**

*Made by the Hurlbut-Rogers Machine Co.*

**T**HE description on last pages will apply to the larger machines, of which details are given below except that these latter are geared.

**4 Inch Machine** will cut off and centre rough shafts from  $\frac{1}{2}$  to 4 inches in diameter. Speeds of countershaft, 100 and 160 revolutions per minute. Pulleys, 12 inches  $\times$  3 inches.

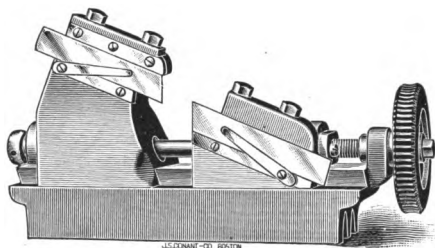
Price, F. O. B., Boston . . . . . \$

**5 Inch Machine** will cut off and centre rough shafts from  $\frac{1}{2}$  to 5 inches in diameter. Speeds of countershaft, 120 and 200 revolutions per minute. Pulleys, 14 inches  $\times$  4 inches.

Price, F. O. B., Boston . . . . . \$

### ***Patent Tool Holder.***

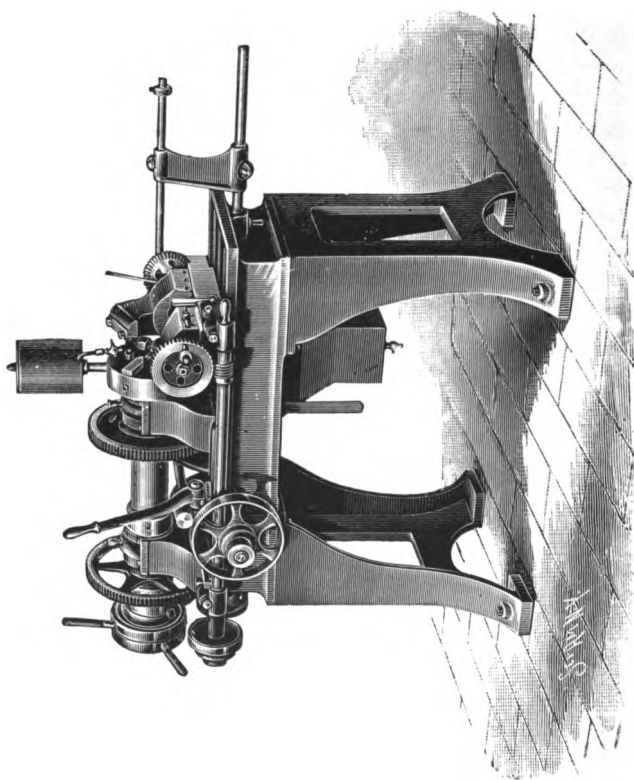
***For the Hurlbut Cutting-off Machines.***



**T**HE blades are held perfectly solid and supported to the very edge, and are set at an angle which gives a heavy shearing cut, and if ground square, will always cut square, and turn out a vastly greater amount of work.

With these holders the makers supply the blades which we carry in stock.

*Hurlbut-Rogers Cutting-off Machine.*



***New Automatic Variable Speed Cutting-off Machines,  
With Constant Cutting Speed.***

*Made by the Hurlbut-Rogers Machine Co.*

---

**I**N these Machines the speed of revolution of the spindle and work increases as the knives feed in. By this means the actual cutting time is reduced to *one-third* that of the constant speed machines and the actual daily product is fully doubled.

The mechanism consists of discs driven by friction wheels on their face. As the cutter heads feed in they move in the driving friction wheels, increasing the speed of the discs and the spindle with which they are geared.

2-inch and 4-inch machines are now in stock. Other sizes to order.

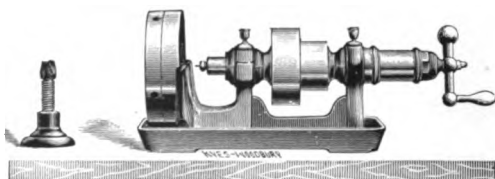
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Price, 2-inch variable cutting-off machine . . . \$

“ 4 “ “ “ “ . . .

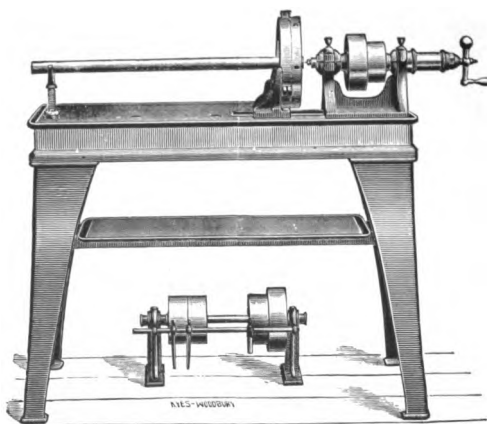
OTHER SIZES TO ORDER.

*Whiton's No. 1 Centering Machine.*



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*Whiton's No. 3 Centering Machine.*





*Whiton's Centering Machine.*

**T**HESE Machines are designed for centering and drilling round iron preparatory to working it in a lathe. They are a combination of a universal scroll chuck, for holding the work, with a traversing spindle carrying a drill, the two being so arranged as to be perfectly central.

At one operation they will centre and drill any size of round iron to which they are suited. The spindle is fitted with a split chuck for holding twist drills.

They can be supplied, if desired, with 4-jaw chucks for square iron.

**DETAILS AND PRICES.**

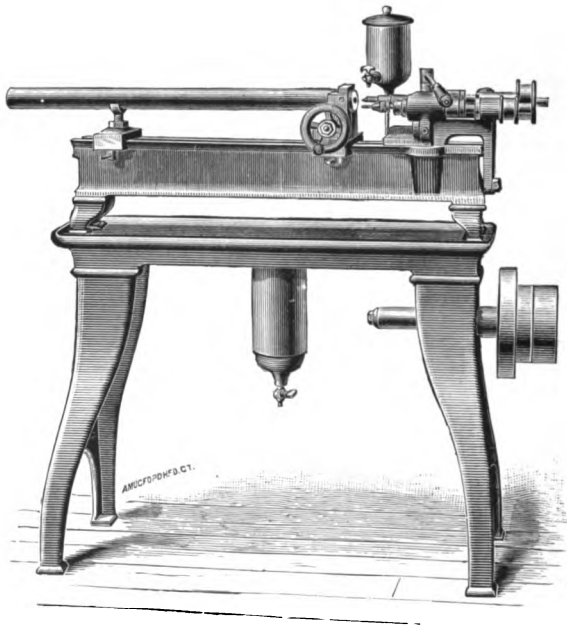
	No. 1.	No. 2.	No. 3.	No. 4.
Size iron will take . .	3 inch.	4½ inch.	5½ inch.	7½ in. for car axles, etc.
Countershaft rev. . .	400	400	400	
Counter pulleys . .	6 x 2 in.	6 x 2 in.	6 x 2 in.	
Price . . . . .				
" tables for Nos. 1 & 2				

*Whiton 2 Spindle Centering Machine.**For Drilling and Counter-Sinking.*

**T**HIS Machine is made like the No. 3 except that the head racks carries two spindles side by side, either of which can be brought opposite the centre of the work.

Price, . . . . . \$

## *2 Spindle Centering Machine.*



*Price and description of this machine on opposite page.*

## *2 Spindle Centering Machine.*

*Made by The Pratt & Whitney Company.*

---

**D**ESIGNED for drilling and countersinking the centres for turning, in iron or steel shafts of 3 inches diameter and smaller, and of any length. It is particularly adapted for making centres in short or long pieces that have been cut from the bar by a cutting-off lathe, but will also handle stock of any length cut off at the forge, making a drilled and countersunk centre with one setting in the vise.

The bed is 40 inches long.

The spindles are carried in a rocking head, and are driven at different speeds by means of pulleys on the end of the machine, which pulleys are driven from a countershaft overhead.

The vise is made to open and close by a right and left hand screw, and the jaws bring the work into line with the drilling and countersinking spindles when they are closed on the work.

The vise is gibbed to the bed, and can be adjusted to any distance from the tools, and clamped in the required position.

The lever for feeding the drill is also used to swing the rocking head over and bring the countersinking spindle into position. On rough work it is customary to start the hole with the point of the countersink, thereby avoiding much of the risk of breaking the small centre drill.

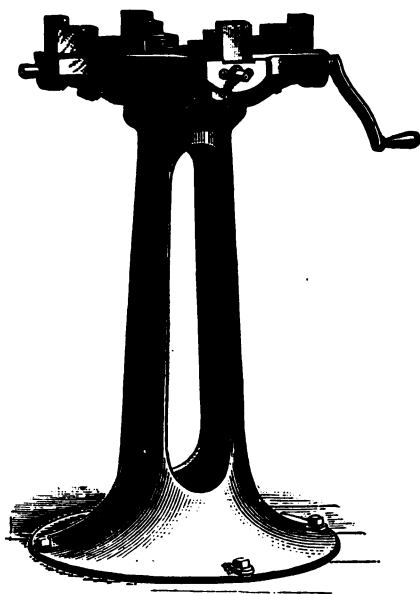
There is also furnished with the machine a V rest with vertical adjustment for supporting long work. This rest has the angle of the V and the thread on its stem so proportioned that one complete turn of the nut elevates the rest to take a shaft  $\frac{1}{4}$  inch less in diameter. The elevating nut is graduated, and can be accurately adjusted for any diameter within the limits of the machine.

The machine is also furnished with oil tanks, and countershaft with  $7 \times 2\frac{3}{8}$  inch tight and loose pulleys, which should run 175 revolutions per minute.

**Weight, 460 pounds.**

**Price . . . . .**

*Flatber's Reaming Stand.*



*Price and description of this machine on opposite page.*

### *Flather's Hand Reaming Machine.*

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**T**HE cut on opposite page represents a device for holding work to be either reamed or tapped out by hand, and will be found a very useful machine to have in a shop. It can be set in any convenient place, and bolted to the floor.

The machine will hold work from 20 inches down to  $1\frac{1}{4}$  inches in diameter. There is a hole in the center of the chuck 4 inches in diameter; so the reamer will go through the chuck, and can be taken out of the side of stand. The jaws of the chuck are extra large and strong, and are made of steel castings. The screws are also made of steel. The workmanship is first-class in every respect. We also have a machine to hold work from 30 inches down to 3 inches in diameter.

---

Price, No 1, complete . . . . .	\$50 00
“ No. 2, “ . . . . .	.

*Dupont Power Hammer.*



### *The Dupont Power Hammer.*

**T**HE Hammer is operated by an adjustable crank, the crank-pin sliding in a groove in the crank-plate to lengthen or shorten the stroke. The crank is connected with a spring by means of a connection sliding in a leeve or collar, to raise or lower the ram or head, to accommodate thick or thin work. Two side arms hinged to the sleeve are attached at the lower end of the ram or head by means of metal links, the spring being between these side-arms, making an elastic connection or cushion that takes all the jar of the blow from the running parts of the machine.

The head strikes a quick blow (at the rate of 250 to 350 strokes per minute), and gets away from the work instantly, thereby avoiding all chilling of the work.

Raising or lowering the hammer is accomplished by loosening one bolt, and when at the required place tightening it again.

The spring is quickly adjusted by the screws at the ends. There being no leather straps to break or wear out (all connections being metallic), when once adjusted the spring seldom needs any readjusting.

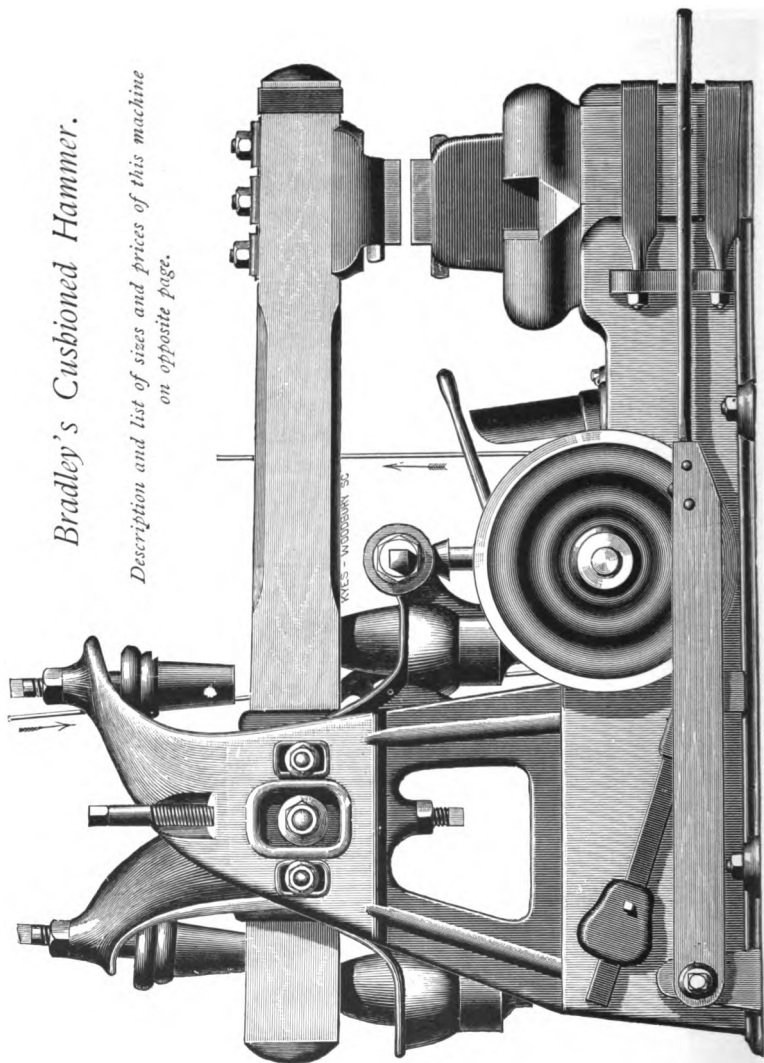
The dies are keyed in head and anvil and may vary in thickness any amount within the limit of the stroke.

#### PRICES AND WEIGHTS.

25-lb. Hammer	Weight, 1000	Price, \$
50-lb.     "     . . .	1200     . . .	"
75-lb.     "     . . .	1500     . . .	"
100-lb.    "     . . .	2000     . . .	"
125-lb.    "     . . .	2700     . . .	"
150-lb.    "     . . .	3500     . . .	"
200-lb.    "     . . .	4000     . . .	"
300-lb.    "     . . .	5000     . . .	"
500-lb.    "     . . .	9000     . . .	"

*Bradley's Cushioned Hammer.*

*Description and list of sizes and prices of this machine  
on opposite page.*





### *Bradley's Rubber Cushioned Helve Hammers.*

**H**ELVE is hung upon two hardened adjustable steel centres, and almost perfectly balanced, and is put in motion by a broad eccentric, consisting of an iron hub, a bronze shell, and a cast-steel strap, all so perfectly fitted up as to run almost free from friction, and to be entirely adjustable.

The action of the helve in connection with the oscillator and rubber cushions is the nearest possible approach to that of the smith's arm that has ever been attained by the use of mechanical ingenuity.

The bearings of the main shaft are made of the finest bronze, and all the others of the best quality of anti-friction metal, and the action of the broad steel eccentric is regulated by the use of a universal joint connection.

The foundation for the anvil block and the main bed are wholly independent of each other, and yet are so united that nearly the entire jar of the blow of the hammer is transmitted to that of the anvil block alone. So accurately are the parts adjusted, and so equally is the dead weight of the blow distributed through the parts intended to receive it, that one can scarcely identify the strokes of the hammer when under the most rapid and violent motion, even if the hand is held on the working parts.

The average power necessary in actual use to run these hammers varies from  $\frac{1}{2}$  to 2 horse power, according to size.

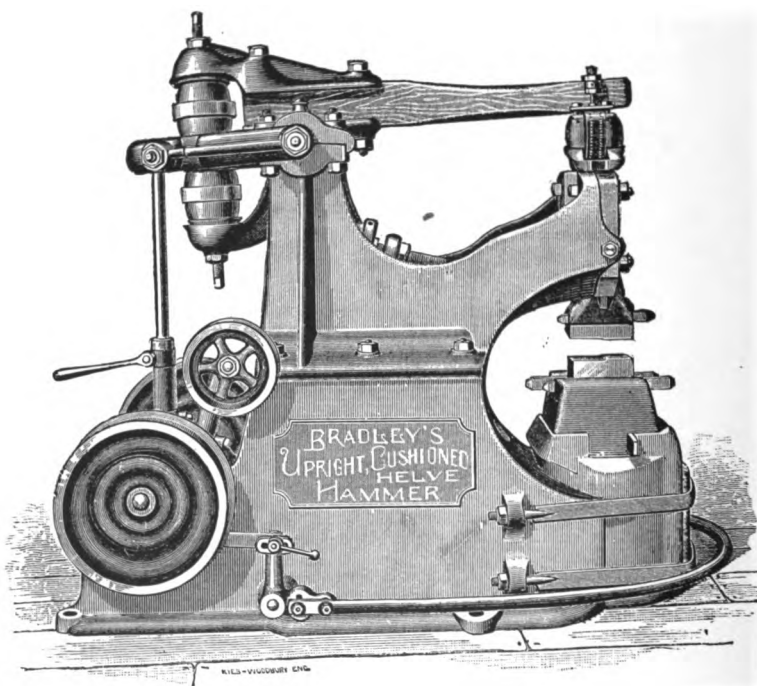
The power is applied by means of a foot treadle running around the bed of the hammer in such a manner that the operator, standing in front or on either side, can, by a gentle pressure of the foot, bring the tightener pulley in connection with the belt on the drive pulley, and thus vary the stroke in proportion to the pressure applied.

On removing the pressure, the brake at once acts on the balance wheel, bringing the hammer to a stop instantly, and with the helve up, as it never stops with the dies closed,—a feature which every hammersman will appreciate.

25	pound	hammer,	shipping	weight	1,800	pounds;	price,	\$
40	"	"	"	"	2,800	"	"	
60	"	"	"	"	4,600	"	"	
80	"	"	"	"	5,800	"	"	
100	"	"	"	"	6,000	"	"	
200	"	"	"	"	9,500	"	"	

*Send for special catalogue with full particulars.*

*Bradley's Upright Cushioned Helve Hammer.*



*Description and list of sizes and prices of this machine on opposite page.*

*Bradley's Upright Cushioned Helve Hammers.*

EVERY working part of the entire hammer is in full view of the operator, and the whole is so simple in construction and manner of adjustment that the most inexperienced hammersman has no trouble in operating it to its full capacity at once. A split friction sleeve on the pitman at the rear of the hammer allows the length of stroke to be instantly adjusted,—a matter of great value when material greatly differing in size has to be successively worked,—a point that every hammersman will at once appreciate. By a very simple arrangement the keys holding both upper and lower dies are removed, as well as driven in from the front, instead of compelling the use of a long bar in driving out the keys from the rear,—a valuable consideration when time is an object, or in adjusting dies where accuracy is required.

By the use of a friction sleeve on the pitman,—a device used with no other make of hammer in existence,—the opening or distance between dies when at rest can be varied from actual contact to 6 or 7 inches in the smallest size of hammer, and 12 to 15 inches in the larger sizes. These variations can be brought about instantly, making the hammer especially valuable in jobbing shops, where material differing greatly in size has to be worked. In making these various changes, no other of the working parts of the hammer have to be adjusted, as the one operation of changing the length of stroke adjusts every working part at the same time.

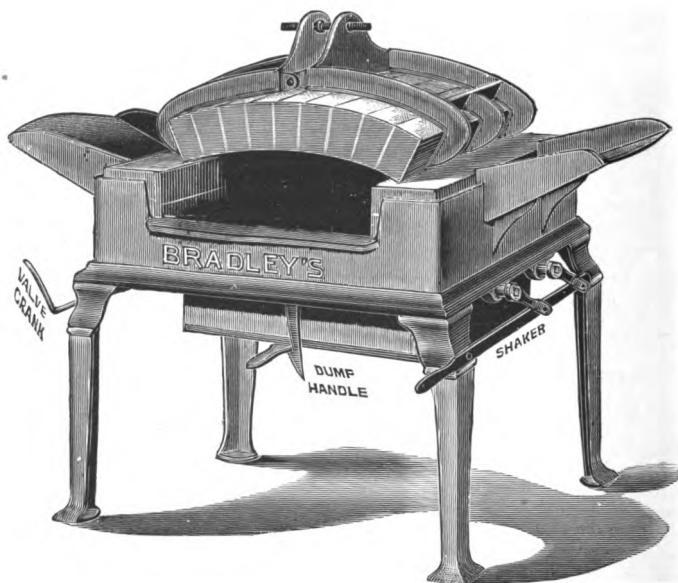
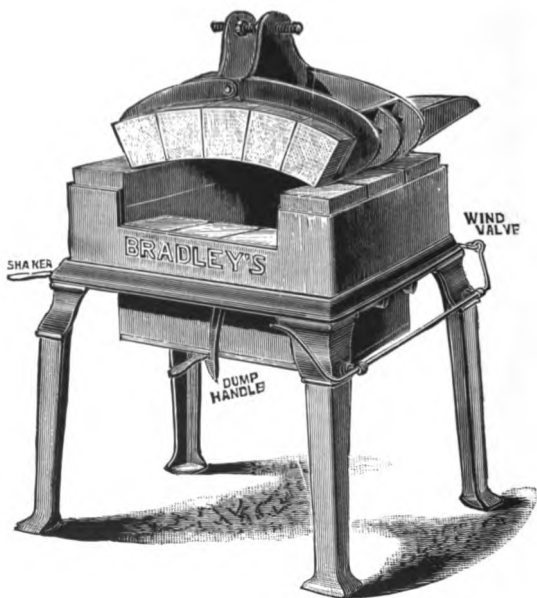
We are now prepared to furnish these hammers in eight sizes, the weights of the hammerheads ranging from 30 pounds in the smallest, to 500 pounds in the largest.

---

**Hammer with 15 pound ram, weight 1,000 pounds; price, \$**

"	"	30	"	"	"	1,800	"	"
"	"	50	"	"	"	2,800	"	"
"	"	75	"	"	"	2,800	"	"
"	"	100	"	"	"	3,500	"	"
"	"	125	"	"	"	3,500	"	"
"	"	150	"	"	"	5,000	"	"
"	"	200	"	"	"	5,000	"	"
"	"	300	"	"	"	8,000	"	"
"	"	500	"	"	"	12,000	"	"

## *Bradley's Heating Forges.*



*List of sizes and prices of these forges on opposite page.*

**Bradley's Heating Forges.**

FOR HARD COAL OR COKE.

**H**EATING Forge **No. 1** has two grates, each  $3\frac{1}{2} \times 9$  inches, making a total grate surface of  $7 \times 9$  inches, and is suitable for welding as well as heating light work.

**No. 2** is same as **No. 3**, except that the grates have a total surface of  $9 \times 14$  inches. This is the size best adapted for general use for all the hammers for heating, and can be successfully used for welding.

**No. 3** has 2 grates, each  $7 \times 23$  inches, making a total grate surface of  $14 \times 23$  inches, and is intended for heating large and heavy work, and irons for bending and forming. If required, it can be so arranged as to heat from the end instead of the side; in which case it should be so stated in the order.

**No. 4** has 2 grates, each  $4\frac{1}{2} \times 19$  inches, making a total grate surface of  $9 \times 19$  inches. If desired, the fire brick in front can be cut out to the cast-iron frame, making the fire opening larger.

**No. 5**, end working, has 4 grates, each  $4\frac{1}{2} \times 20$  inches, making a total grate surface of  $9 \times 40$  inches. It can be worked from the ends or side, as shown in cuts on opposite page. In ordering, state which way you wish to use it.

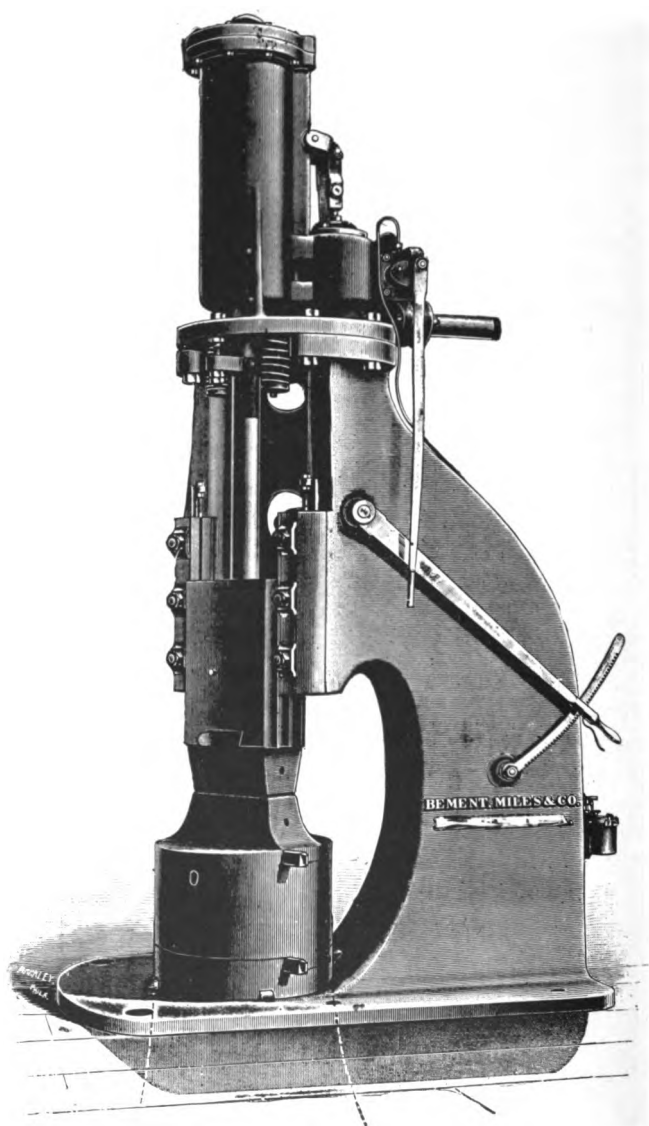
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Price, <b>No. 1</b> , without fire brick . . . . .	\$
“ <b>No. 2</b> , “ “ “ . . . . .	
“ <b>No. 3</b> , “ “ “ . . . . .	
“ <b>No. 4</b> , “ “ “ double end . . .	
“ <b>No. 5</b> , “ “ “ “ “ . . .	

---

*Send for special circular, giving full particulars.*

*Single Stand Steam Hammer.*



## **Steam Hammers.**

### **With and Without Adjustable Guides.**

*Made by Bement, Miles & Co.*

**C**UT opposite illustrates single frame hammers with detached anvils, valves perfectly balanced, and valve gear simple and substantial, producing automatically, or by hand, every desired variation in the length and force of blow. Double acting, taking steam above and below piston. The ram and guides are set either diagonally or straight with the frames, and the piston so arranged that it can be raised above top of cylinder for insertion of packing rings without separating the rod from the ram.

Every hammer is tried with steam before leaving our works.

Size of Hammer. (Falling Weight.)	Diameter of Cylinder and Length of Stroke.		Face of Ram or Ram Die.	Price.
	Diameter.	Stroke.		
*200 pounds.	4¾ inches.	13 inches.	5 x 7¾ in.	
250 "	5 "	16 "	5 x 7¾ "	
*300 "	5½ "	16 "	5½ x 9 "	
350 "	5½ "	18 "	6 x 8½ "	
*500 "	6¼ "	20 "	6½ x 10½ "	
600 "	7 "	22 "	6¾ x 10½ "	
700 "	7 "	22 "	7¼ x 12¼ "	
800 "	8 "	22 "	7¼ x 12¼ "	
1,100 "	10 "	28 "	8¼ x 13 "	
1,500 "	11½ "	30 "	9 x 16 "	
2,000 "	13 "	33 "	9½ x 16½ "	
2,500 "	14 "	36 "	10½ x 17¼ "	
4,000 "	18 "	43 "	12 x 20 "	

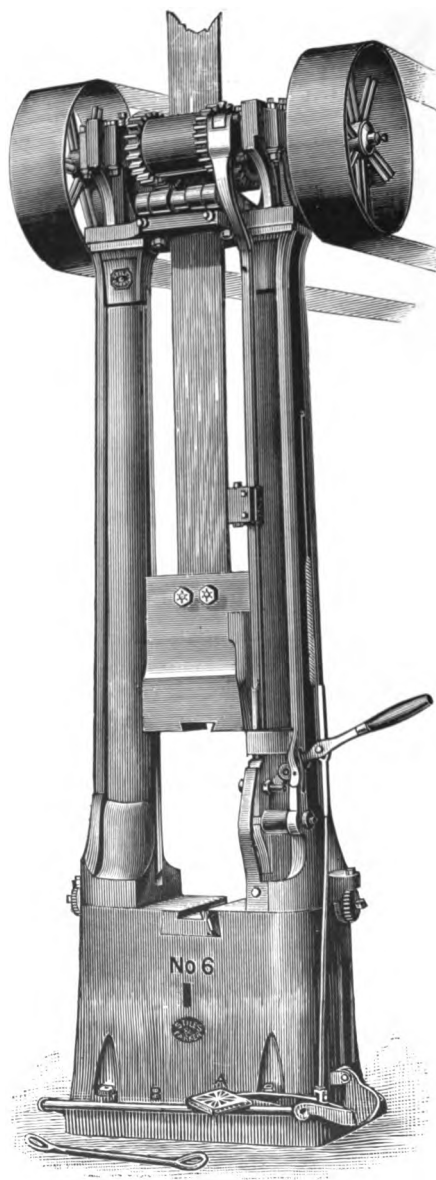
\* These sizes have fixed guides; others are adjustable.

The face of ram only determines the size of the dies one way between the guides; the other way, they can be made to suit the needs of the purchaser.

The smaller sizes of these hammers can be fitted when required, with a patent treadle, by which the hammer man can work the valve gear with his foot. The hammer can be started upward off the anvil, or made to hang *suspended* and start with a *downward* blow.

We can also supply double frame hammers to the heaviest sizes for iron and steel working, for stamping for heavy drop forging, etc.

*Friction Roll Drop Hammer.*



*Description and list of sizes and prices on opposite page.*



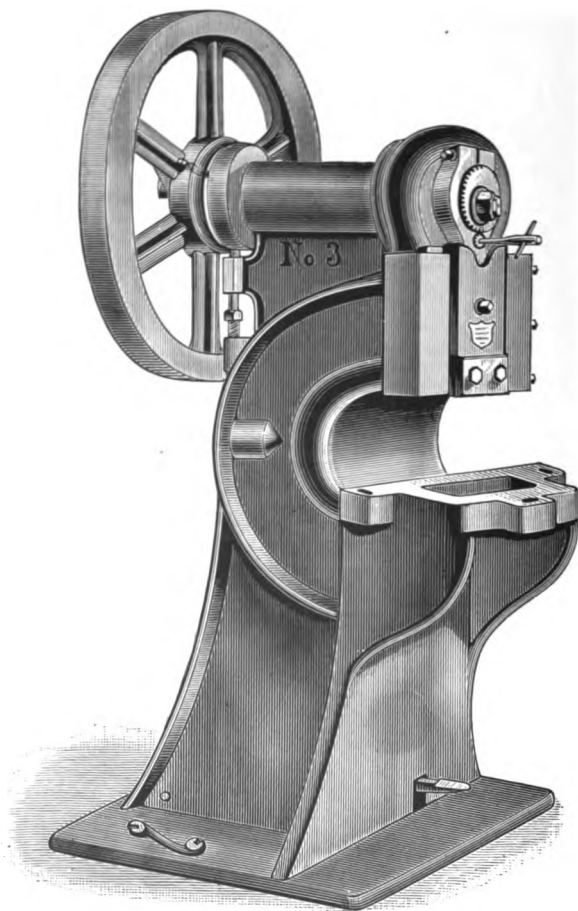
## *Patent Drop Hammers.*

THE Stiles Patent Drop Hammers, represented in cut on opposite page, are distinguished from other hammers constructed on the friction roll and board principle, by several valuable features, which not only make them more accurate and durable, as well as less liable to get out of order, but also enable the operator to exercise a more thorough control, with less exertion, over their movements. In place of the dog which is usually used to hold up the hammer (which is limited in adjustment to holes located at fixed distances in one of the uprights), this machine is provided with an eccentric clamping device which permits the hammer to be stopped instantaneously at any point, and to be dropped from whatever height it was stopped at. No treadle disconnections and tedious adjustments of any kind to effect a change in the length of stroke.

The hammer can be operated either as an automatic machine, or with variable blows to follow the movement of foot or hand lever. The hammer is always caught and held centrally; thus not only relieving the sides from the continual shocks, which with the above mentioned device of other makers not only cause so many breakages, but also avoiding the uneven wear of the guides provided by the tilting movement given to the hammer when it falls one-sidedly on top of the dog. Special devices make it possible to always catch the rebound of the hammer, whatever the height of the dies. The principal nuts are notched, and held in position by spring pin to prevent them from jarring loose. These machines are extra heavy, and all the parts are first-class in material and workmanship. All our drops have the Automatic Trip, for which we make no extra charge.

WEIGHT OF HAMMER.	PRICE FOR FORGING, WITH LIFTER.	Price for Sheet Metal, or with Poppets and Lifter.	EXTRA FOR "OPEN GAP" FRAME.	LENGTH OF UPRIGHTS.	DISTANCE BETWEEN UPRIGHTS.		WEIGHT, COMPLETE, ABOUT.
					FOR FORGING.	WITH POPPETS.	
50 lbs.				48 in.	6 in.	6 in.	1,200 lbs.
100 "				54 "	8 "	8 "	2,000 "
200 "				60 "	10 "	12 "	4,000 "
300 "				72 "	12 "	14 "	5,500 "
400 "				84 "	14 "	16 "	7,000 "
600 "				84 "	15 "	18 "	10,000 "
800 "				96 "	16 "	20 "	12,500 "
1,000 "				96 "	16 "	25 "	16,000 "
1,500 "				108 "	16 "	36 "	24,000 "
2,000 "				108 "	18 "	36 "	30,000 "

*Stiles No. 3 Punching Press.*



## *The Stiles Punching Presses.*

### New Designs and Heavier Patterns.

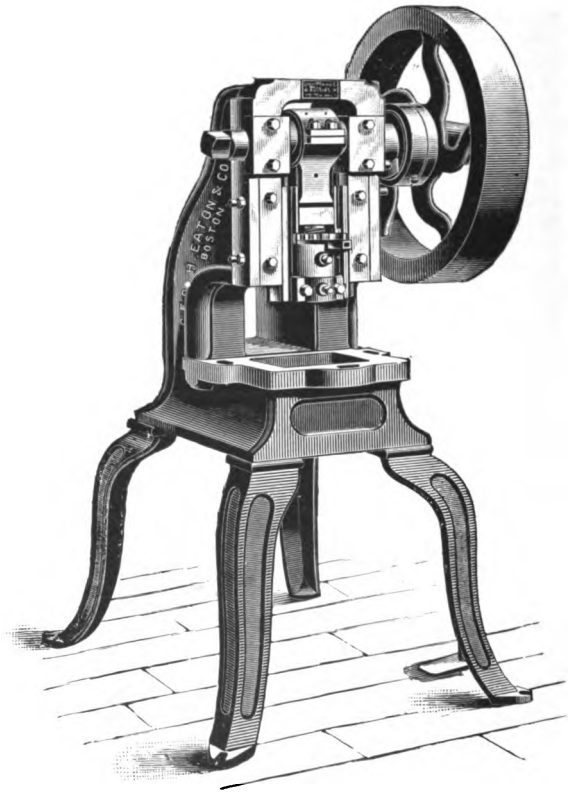
THE cut on opposite side represents the No. 3 size of the well-known Stiles Punching Presses, which for more than twenty years have been the leading presses of this class. They are now built from entirely new patterns, making them very much heavier, besides adding quite a number of valuable improvements. Aside from the advantages embodied in the design of the frame, which is calculated to combine the greatest stiffness with such shapes and dimensions as make the machine peculiarly handy and accessible for manipulating dies and material, its principal points of supremacy lie in the Stiles automatic clutch and the steel pitman, which has a solid bearing on its ends instead of a pin to take the pressure, and the eccentric adjustment, which, unlike other adjustments of this kind, is attached to the upper part of the pitman surrounding the crank pin, thus always keeping the action or thrust central. The old device of putting the eccentric adjustment at the lower end of the pitman is very objectionable, not only because it shifts the centre of the pitman end away from the centre of the slide, thus causing an oblique one-sided strain on the gibs and side, but also because it throws the whole pressure on a pin which it is hardly possible to make strong enough for the purpose. The adjustment ring in the Stiles Press is of steel, bushed with gun metal, for the crank pin bearing.

Further particulars on application.

NUMBER	Weight complete, New Pattern.	Size of Opening in Bed.	Distance back from centre of Slide.	Distance from end of Slide to Bed when Ring and Slide are up.	Motion or Stroke of Slide.	Adjustment of Slide.	Will receive Punch Stem Round or Square.	Size of Fly-Wheel, New Pattern.	Weight of Fly-Wheel, New Pattern.	PRICE.
0	Lbs. 500	Inch. 3 × 5	Inch. 4	Inch. 5	Inch. 1	In. 1	Inch. $1\frac{1}{8} \times 2$	Inch. 18 × 2½	Lbs. 125	
1	900	4 × 6	4½	5	1	1	$1\frac{1}{8} \times 2$	24 × 3½	225	
2	1,650	5 × 8	6	6	1½	1	$1\frac{1}{8} \times 2\frac{1}{2}$	30 × 4½	350	
3	3,000	7 × 10	7½	7	1½	1	$1\frac{1}{8} \times 3$	36 × 5½	600	
4	4,800	9 × 12	9	8	1½	1	$1\frac{1}{8} \times 3$	42 × 6½	900	
5	7,500	11 × 14	10½	9	1½	1	$1\frac{1}{8} \times 3$	50 × 7½	1,350	
BACK GEARED PRESSES, GEARED SEVEN TO ONE.										
3	3,400	7 × 10	7½	7	1½	1	$1\frac{1}{8} \times 3$	30 × 4½	350	
4	5,400	9 × 12	9	8	1½	1	$1\frac{1}{8} \times 3$	36 × 5½	600	
5	8,650	11 × 14	10½	9	1½	1	$1\frac{1}{8} \times 3$	42 × 6½	900	

The general dimensions can be slightly changed to suit dies and tools of other makers

*No. 4 Power Press.*



**Power Presses.***Made by Geo. H. Eaton & Co.*

**T**HESE are well made and well proportioned machines, and offered at reasonable prices.

In addition to presses described on this and next pages, we are prepared to bid on a great variety of machines suited to this class of work, or for special machinery of similar kind.

**POWER PRESSES. (Not Geared.)**

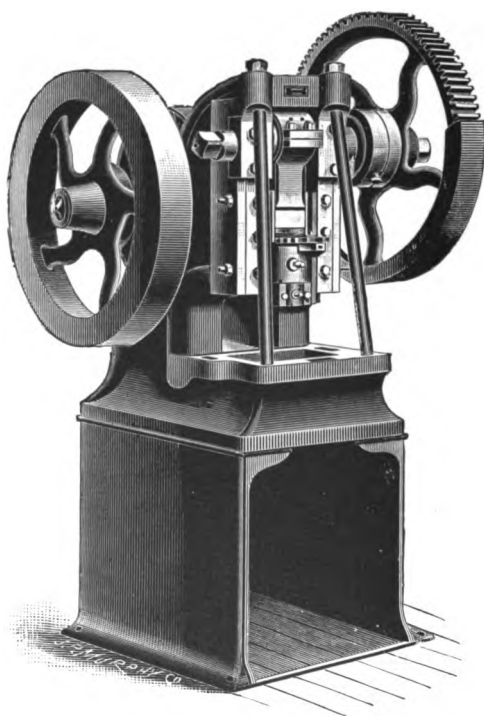
	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
Weight, complete . .	230 lbs	600 lbs.	1,100	1,650	2,800
Opening in bed . . .	4½ x 5	5 x 6 in.	6 x 8 in.	7¼ x 9½	8 x 10 in.
Distance back from centre of slide . . .	3½ in.	3¾ in.	4½ in.	6 in.	6 in.
Adjustment of slide .	None.	¾ in.	1 in.	1 in.	1 in.
Height from bed to slide when up . . .	4 in.	6 in.	6½ in.	7¼ in.	7¼ in.
Stroke . . . . .	¾ in.	1¼ in.	1¼ in.	1½ in.	1½ in.
Diameter of balance wheel . . . . .	16 in.	18 in.	24 in.	27 in.	32 in.
Face of balance wheel	3 in.	3¾ in.	4 in.	4¾ in.	5½ in.
Weight of balance wheel . . . . .	85 lbs.	130 lbs.	240 lbs.	320 lbs.	450 lbs.
Price . . . . .					
Price on stand . . . .					

Nos. 5 and 6 are furnished with removable stay bolts.

All sizes furnished on "legs" at same price.

We furnish "bases" unless otherwise ordered.

*Power Press.*

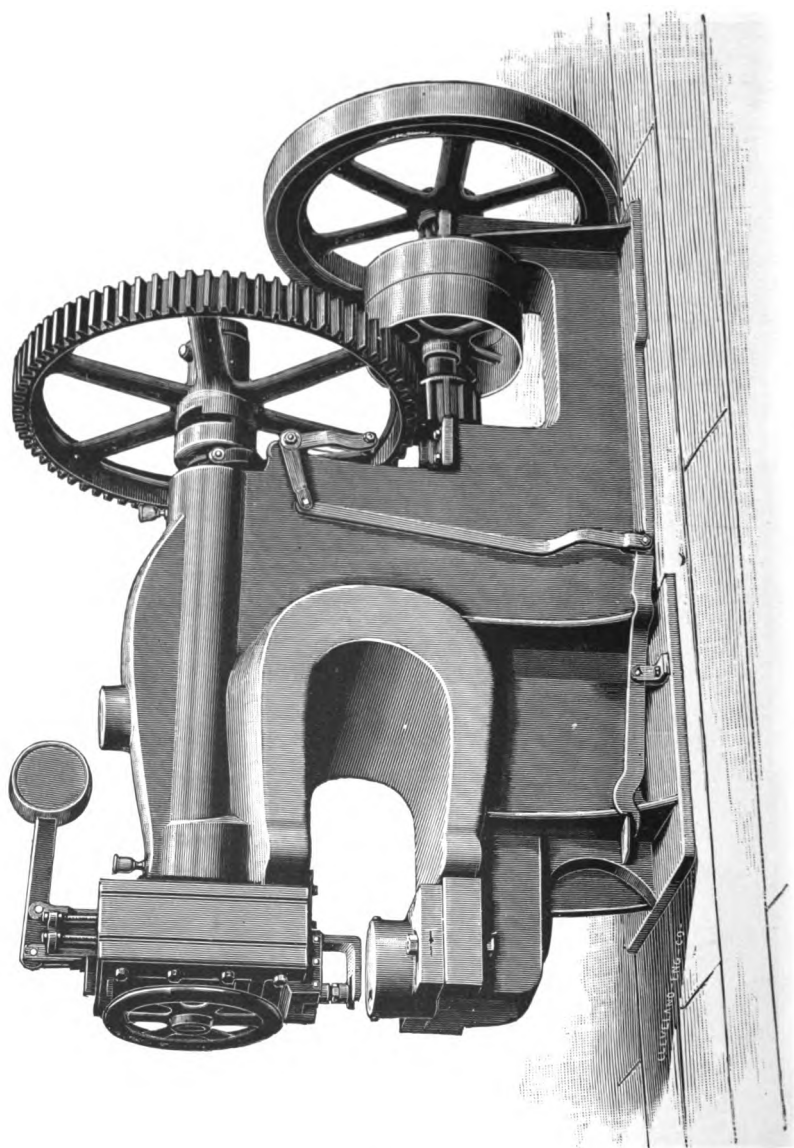


***Power Presses.****Made by Geo. W. Eaton & Co.***POWER PRESSES. (Geared.)**

	No. 6.	No. 7.	No. 8.	No. 9.
Weight, complete. . .	3,000 lbs.	4,000 lbs.	6,000 lbs.	8,000 lbs.
Opening in bed . . . .	8 x 10 in.	9 x 12 in.	10 x 12 in.	12 x 14 in.
Distance back from centre of slide . . .	6 in.	6 in.	7 in.	8 in.
Adjustment of slide. .	1 in.	1 in.	1 in.	1 in.
Height from bed to slide, when up . . .	7¼ in.	7¼ in.	8¾ in.	10 in.
Diameter of balance wheel . . . . .	32 in.	34 in.	36 in.	36 in.
Face of balance wheel	5¼ in.	6 in.	6½ in.	7½ in.
Weight of balance wheel . . . . .	450 lbs.	600 lbs.	850 lbs.	1,150 lbs.

**Nos. 6 and 7** geared 4 to 1; 32 inch gear; 3 pitch.**No. 8** geared 4 to 1; 34 inch gear; 2½ pitch.**No. 9** intermediate; gear 9 to 1; 2½ pitch.

Stay bolts furnished with all these presses.





**TOOLS FOR**  
***Boiler, Ship Building, Bridge and Safe Work.***

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**T**HE Machine illustrated opposite will punch 1 inch diam.  
by 1 inch thick, 26 inches from edge.

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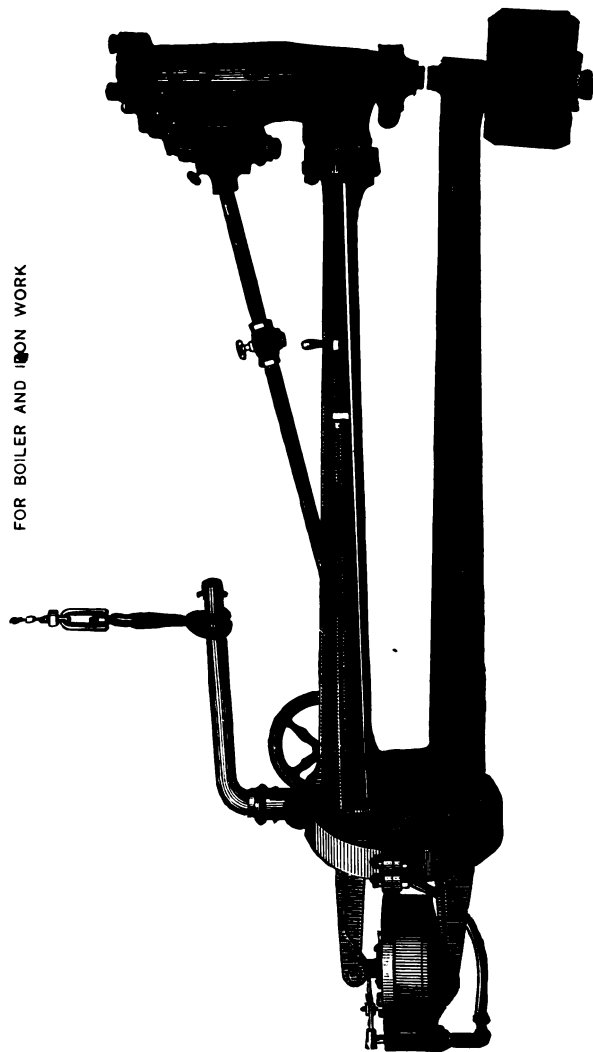
**W**E are prepared to supply **PUNCHES AND SHEARS**,  
single or double of all sizes. Also **PLATE ROLLS**,  
**PLATE PLANERS, STRAIGHTENING MA-**  
**CHINES**, Hydraulic, Steam and Power; **RIVETING AND**  
**FLANGING MACHINES**, and all other tools adapted to this  
class of work.

---

*Full special catalogues with prices, on application.*

*Portable Pneumatic Riveter.*

FOR BOILER AND IRON WORK



*Prices and description of this machine on opposite page.*

## ***Allen's Portable Pneumatic Riveting Machine.***

### ***FOR BOILER AND TANK WORK.***

---

**T**HE Riveter works on the principle of hand work, forming the head of the rivet by a succession of rapid blows around the rivet until the desired shape of the head is obtained.

It consists of two levers, having at one end a pressure cylinder to open and close the levers, and at the other end the Riveting Machine on one arm, and a suitable die with counterweight attached on the other arm.

The Riveting Machine proper consists of a cylinder, with the hammer head or die attached to the end of the piston rod, capable of being easily changed to adapt the machine for different sizes of rivets and heads.

The machine is operated with an atmospheric pressure of from 25 to 30 pounds to the square inch, and makes from 150 to 200 strokes per minute. The time required to form the head of a  $\frac{3}{4}$ -inch rivet is about six seconds; and at steady, straight work, allowing for ordinary detention and loss of time, *two or three rivets* can readily be finished in *one minute*.

Only *one man* and the rivet boy are required to operate with this machine, dispensing with *one riveter* and *the man* to hold on; and 800 to 1,000 rivets a day can be driven.

By suspending the machine from a horizontal bar or travelling carriage, it is easily moved from one rivet hole to the next when operating on a horizontal seam.

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### **ALSO ALLEN'S COMPRESSION JAW RIVETER,**

**For Bridge Work.**

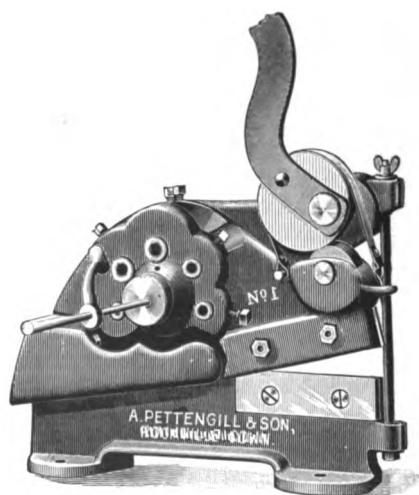
### **ALLEN'S HIGH SPEED AIR COMPRESSOR,**

**For Actuating above Machines.**

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*Special circulars and prices of same on application.*

*Hercules Iron Cutter and Shear.*



***Hercules Iron Cutter and Shear.****Made by A Pettingill & Son.*

**A** MOST excellent machine. Working points have rolling contact. Cutters for round iron and bushings of best cast steel tempered, and can be removed and ground.

The blades have a drawing cut and are made of best tool steel with wrought iron back.

Flat stock may be cut to any length.

**DETAILS AND PRICES.**

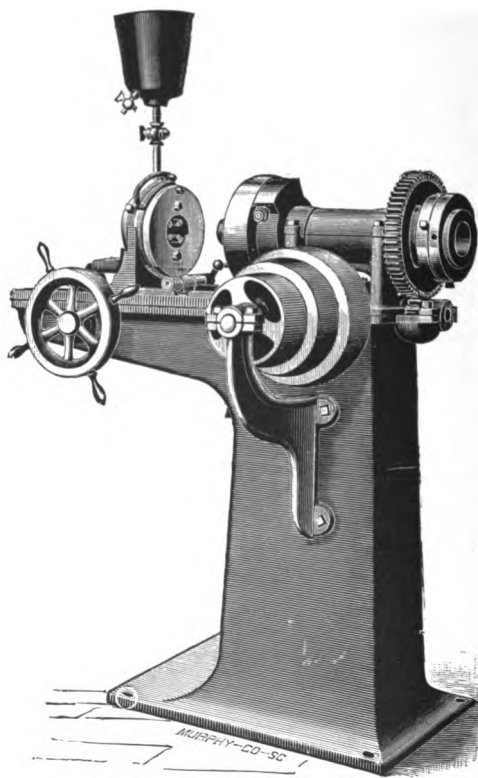
No. o. . . .	Size Round Iron.	Size Flat Iron.	Weight.	Price.
	1/4 inch.	1/8 inch.	14 pounds.	
" 1. . . .	1/2 "	3/16 "	80 "	
" 2. . . .	5/8 "	1/4 "	110 "	

## *Jarecki Pipe Machine. No. 7.*

BACK VIEW.

*Counter Shaft furnished with this Machine.*

*Lubricate Dies with Lara Oil.*



*Description and price list on opposite page.*

### *Jarecki Pipe Machines.*

**T**HE cut on opposite page shows the back view of the No. 7 machine. The Dies are quick opening and adjustable. Each set of four pieces cuts two sizes of pipe, which is a great point in favor of the Machine when new Dies are required.

After pipe is threaded there is no backing off the Dies as in the ordinary manner. All that is necessary is to simply open the Dies and run Die Head back. If Pipe is to be cut off the Dies will expand far enough to admit of Pipe passing through them to the Cutting-Off Knife. When Dies require sharpening they can be quickly removed and ground on any ordinary grindstone. The Die Head is also provided with an Adjustable Stop Pin which is very convenient when a large number of threads of the same size are to be cut. Ordinarily every time a thread is cut the Dies must be carefully reset. With this Adjustable Stop the Dies are first set to the size to be threaded, then the Adjustable Stop moved and secured which will only allow the Cam to move to the point required to thread the proper size without the necessity of carefully resetting for every thread that is to be cut.

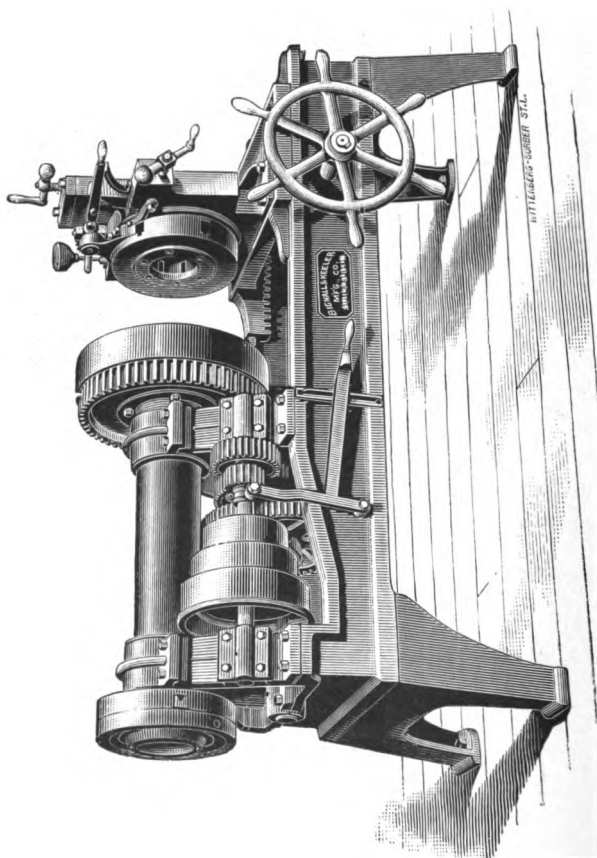
There are no loose Bushings on the Machine which when required cannot be found. On back end of Spindle is an Adjustable Self-Centering Chuck to center the Pipe. Also the same on Die Head to steady the Pipe when being cut with Cutting-Off Knife. The Gripping Chuck is self-centering too and very powerful.

#### LIST OF SIZES AND PRICES.

- No. 6—Hand,  $\frac{1}{4}$  to 2 in., with Adjustable Dies,  
Weight about 600 lbs. . . . . \$
- No. 7—Hand and Power Combined,  $\frac{1}{4}$  to 2 in., with  
Adjustable Dies and Countershaft, Weight  
about 870 lbs., Speed of Countershaft  
200 Revolutions . . . . .
- No. 7A—Hand,  $\frac{1}{4}$  to 3 in., with Adjustable Dies,  
Weight about 1300 lbs . . . . .
- No. 7B—Hand and Power Combined,  $\frac{1}{4}$  to 3 in., with  
Adjustable Dies and Countershaft, Weight  
about 1500 lbs., Speed of Countershaft  
200 Revolutions . . . . .
- No. 8—Hand, 1 to 4 in., with Adjustable Dies,  
Weight about 1650 lbs. . . . .
- No. 9—Power, 1 to 4 in., with Adjustable Dies and  
Countershaft, Weight about 1900 lbs.,  
Speed of Countershaft 200 Revolutions .

*Bignall's No. 4  
Duplex Pipe Cutting and Threading Machine.*

CUTS AND THREADS PIPE UP TO 4 INCHES DIAMETER.





## ***Bignall's No. 4 Duplex Pipe Machine.***

**Cuts Pipe up to 4 Inches in Diameter.**

**E**NGRAVING on opposite page represents Bignall's new and improved Duplex No. 4. It has a new patent die holder, with expanding dies from 1 to 4 inches inclusive. It is so arranged that the dies may be changed without removing die block, plate, or even a screw, which alone makes it the most desirable of all the expanding die machines. The dies are of the simplest order, and can be made by any competent machinist. It can be adjusted almost instantly to suit the inequalities of size in different makes of pipe and fittings. When the thread is cut, the dies are opened, and the carriage run back by hand, thereby saving the time, as well as injury to the dies, in backing off the thread.

A hand attachment can be furnished with this machine when desired, at an additional cost of \$25.00.

An additional sliding plate, with socket for holding solid dies from  $\frac{1}{4}$  to 3 inches, is added without extra charge.

Countershaft is included in price of machine.

Speed, 150 revolutions. Tight pulleys on countershaft, 14 X 3 inches; loose pulleys, 14 X 6 inches.

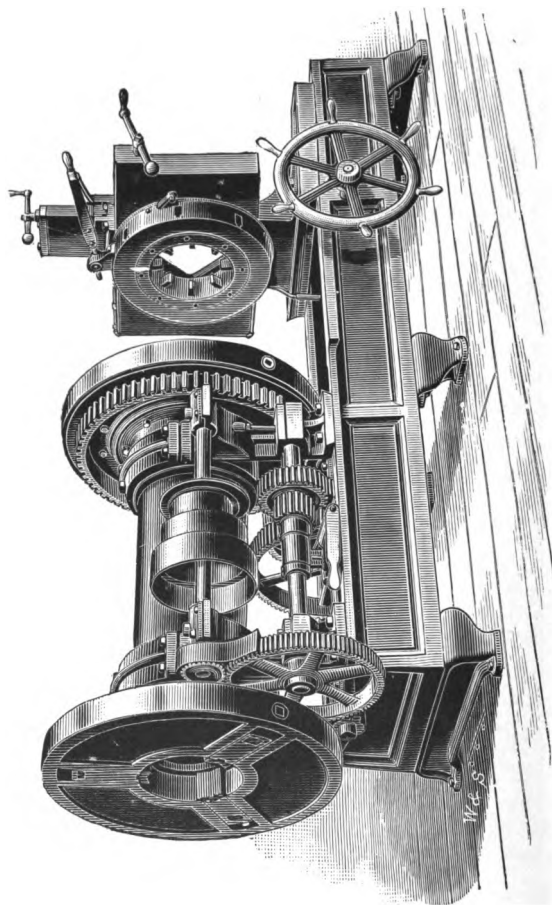
Weight of machine, complete, 2 500 pounds.

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Price, with expanding dies, 1 to 4 inches . . .	\$
“ extra dies, per set of 6 . . . . .	
“ hand attachment, extra . . . . .	
“ socket nipple holders, per set . . . . .	

Solid dies extra at regular prices.

*Bignall's No. 6  
Duplex Pipe Cutting Machine.*



*Prices and description of this and other sizes on opposite page.*

***Bignall's***  
***Duplex Pipe Cutting and Threading Machines.***  
**6 TO 16 INCH.**

**T**HE engraving opposite represents our new Duplex Mill and Jobbing Machines. They have two independent jaw chucks of unusual strength. Either or both can be used at the same time. For long pipe the rear chuck is preferable, as the farther the chuck from the dies the better for both. The jaws are steel faced and tempered, and are flush with the face of the chuck, an advantage found in no other machine. This enables the operator to handle shorter pieces of pipe than with any other make of machine. We can take a piece of pipe 5 inches long, 12 inches in diameter without threads, and thread both ends without the aid of sockets or other device than the chuck of machine. These chucks are graduated to the different sizes of pipe within the range of the machine. This saves the trouble of centering the work. The heads of the chuck screws are countersunk, thus avoiding the dangers of accident. A crooked piece of pipe can be handled easily with these two chucks. Unless preferred otherwise dies are now put next the chuck. Automatic oil pump included.

Loose pulleys, Nos. 6 to 16, 8×16 inches. Tight pulleys, 4×16. 150 revolutions.

No. 6, with dies 2½ inches to 6 inches inclusive; weight about 4,500 pounds; price, . . . . . \$

No. 8, with dies 2½ inches to 8 inches inclusive; weight about 5,000 pounds; price, . . . . .

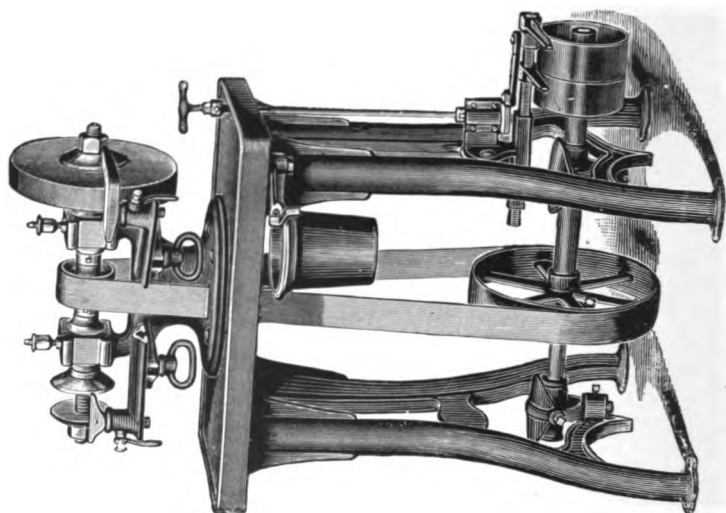
No. 10, with dies 3½ inches to 10 inches inclusive; weight about 6,000 pounds; price, . . . . .

No. 12, with dies 4 inches to 12 inches inclusive; weight about 7,000 pounds; price, . . . . .

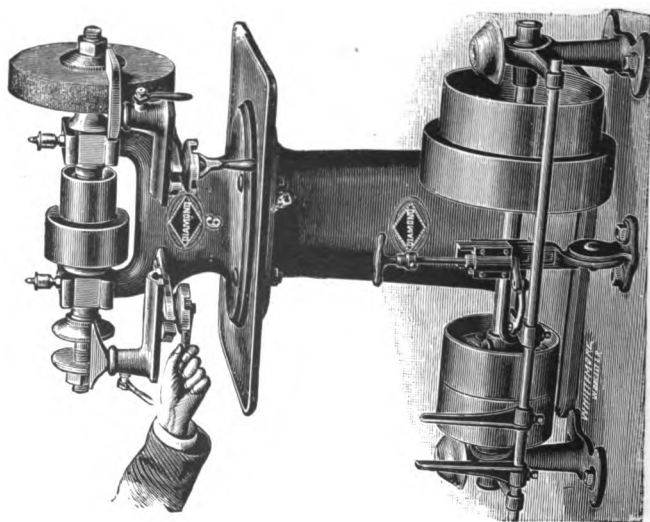
No. 16, with dies 8 inches to 16 inches inclusive; weight about 10,000 pounds; price, . . . . .

Full set of dies (R. H.) and all necessary overhanging machinery and collets included in price of machines.

*Grinding Machine No. 4.*



*Grinding Machine No. 6.*



*Diamond Emery Grinders.*

THESE machines are mounted on columns, and are furnished with countershafts. They have steel spindles, arms for rests, both front and back. The construction of the machine throughout is of equal finish to the best make of engine lathe.

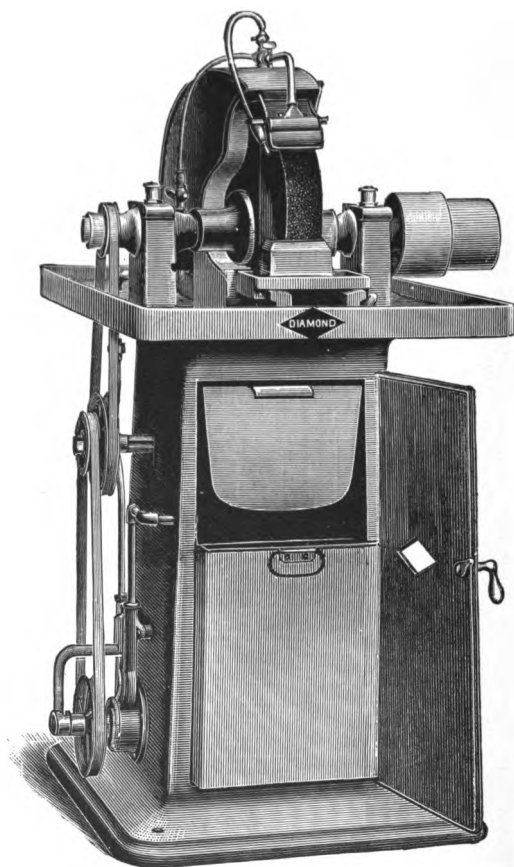
## LIST OF SIZES, DETAILS AND PRICES.

Dimensions, Weights, Prices, Etc.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.
Diameter of wheels recommended . .	12 in.	14 in.	16 in.	22 in.	34 in.	42 in.
Distance between wheels . . . . .	14 in.	16 in.	21 in.	24 in.	38 in.	39 in.
Length of bearings	4 in.	4½ in.	5½ in.	6 in.	9 in.	10 in.
Diameter of spindle in bearings . . .	1½ in.	1¼ in.	1¾ in.	1½ in.	2¼ in.	2½ in.
Diameter of spindle between flanges .	1 in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
Height from floor to centre of spindle . . . . .	30 in.	30 in.	35 in.	34 in.	32 in.	30 in.
Weight complete .		275 lbs.	420 lbs.	550 lbs.	1,500	2,400
Price of head only					Head and Column cast together.	
Price of iron column . . . . .						
Price of counter shaft . . . . .						
Price with column and countershaft						
Price of surface grinding attachment, extra . . .						

We are also prepared to supply every variety of machine for face, surface, knife, die and circular grinding, either dry or with water.

*Special circulars on application.*

*Diamond Single Wheel Tool Grinder.*



*Price and description of this machine on opposite page.*

***Diamond Single Wheel Tool Grinder.***

PATENT APPLIED FOR.

**T**HE machine has tanks located inside of column, easily accessible. A patented (May 7, 1889,) arrangement for drawing the water by syphon from the upper to the lower tank. Engine lathe boxes protected at each end by patented dust excluding device.

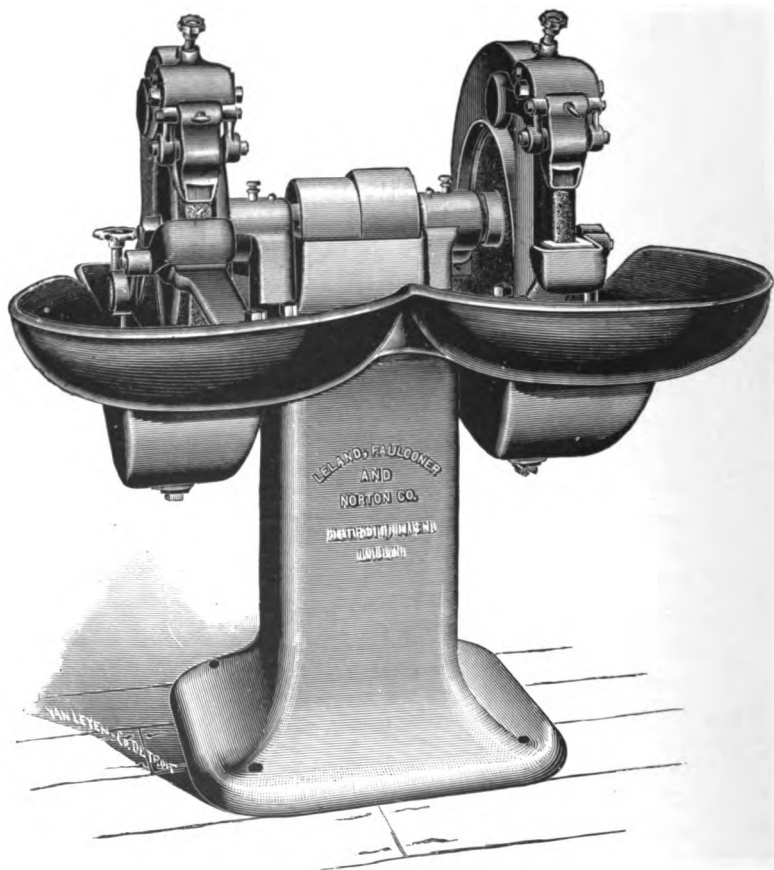
The water is distributed on the wheel directly in front of the tool when being ground. The hood inside has a raised surface cast, which is the outside diameter of the flanges used, and which leads all spray or water from the inside of the hood to the column, keeping it entirely from the spindle and boxes; for this device and others we have applied for patents. The rests are movable to and from the wheel, without the use of wrench. Collars (spindles of steel), pulleys and all running parts are turned inside and out, to obtain a well balanced, smooth-running machine.

**DETAILS AND PRICES.**

	Bench Tool Grinder.	No. 2.	No. 3.	No. 4.	No. 5.
Height centre spindle from floor . . . . .		36 in.	36 in.	36 in.	36 in.
Diam. of spindles in boxes . . . . .		1½ "	2 "	3 "	3½ "
Length in boxes . . .		7 "	8 "	9 "	10 "
Diam. and face wheel	10 x 2 in.	18 x 2½	26 x 3½	30 x 4	36 x 4
Diam. and face countershaft pulleys . .		8 x 4¾	10 x 5	14 x 6	16 x 6
Price with trueing device and countershaft . . . . .				.	

***Double Wheel Grinders.****Special circulars on application.*

*Leland, Faulconer & Norton Co.  
Tool Grinder.*



**DIMENSIONS.**

Water pan, 45 x 49 inches. Distance from floor to centre of spindle, 38 inches. Spindle bearings  $2\frac{1}{8}$  inches long. Spindle pulleys, one, 7 inches, the other 8 inches in diameter—4 inch belt. Emery wheels 24 inches in diameter,  $1\frac{1}{2}$  inch face. Distance between wheels,  $25\frac{1}{2}$  inches.



***Leland, Faulconer & Norton Co.***  
***Tool Grinder.***

**T**HE form of bowls enables operator to stand at same distance in every position.

**Rests** are provided with water guards. A special guard prevents injuring the stone by thrusting work into it when starting to grind tools. Wheel guards and rests are moved back, as wheels wear and are secured by adjustable bronze bolts.

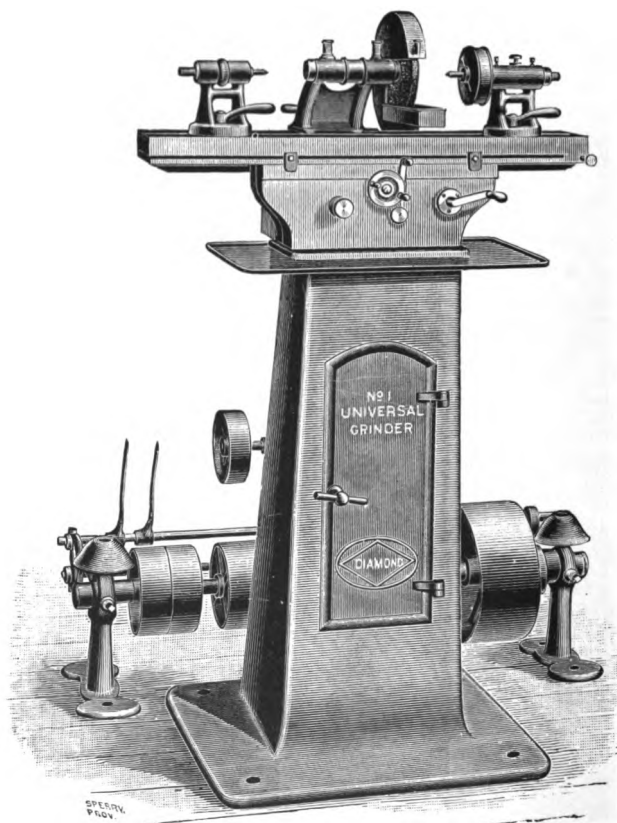
**Water Supply.**—The water supply may be perfectly regulated by the operator. Any desired amount from a slightly moist stone to a flood may be obtained without wetting either the operator or the floor, by turning a hand wheel, and after the water is adjusted the supply is constant, as there are no pipes, cocks or pumps to clog the flow. The wheels are thus constantly saturated with water. A little reflection will convince one that this is a very desirable result as compared with the intermittent wet and dry wheel, which is a feature of all other machines.

**Device for Keeping Wheels True**—The wheels are kept true and in the most perfect condition for their work, *without the use of a diamond*, with its inevitable extravagance in money and time. This result is accomplished by simply turning a small hand wheel. It can be done at any time without in the least interfering with the work, or removing the rest, or any part of the machine, and requires *but an instant to make them perfectly true*.

**Truing Rolls** are of steel, the arbor hardened and ground, and run in bronze bearings; are inexpensive and easily replaced.

**Price,** . . . . . \$

*Diamond Universal Grinding Machine.*



*See opposite page for price and description.*

### *Diamond Universal Grinding Machine.*

IT is especially adapted for grinding straight and taper, soft or hardened spindles, arbors, cutters, reamers, etc., also for grinding out rings, hardened boxes, etc., by means of a special chuck, which can be furnished with the machine. The table has both automatic and hand feed, the change being made from one to the other by simply turning knurled handle in front of machine. The work can be revolved upon dead centers or otherwise. The wheel is brought to and from the work by means of a screw and hand wheel in front of machine. All bearing surfaces are well protected from emery dust. The wheel is arranged to use water to prevent drawing the temper on hardened work. The table can be set at an angle turning about a central pivot, thus providing means for grinding tapers up to  $1\frac{1}{4}$  in. to the foot. The end of table is graduated. The emery wheel spindle is arranged at one end for receiving taper arbors, on which small wheels can be used for grinding out holes, or on any inside work.

#### DETAILS OF NO. 1 UNIVERSAL GRINDING MACHINE.

Distance between centers, . . . . .	20 inches.
Length of traverse, . . . . .	16 "
Swing, . . . . .	8 "
Will use emery wheel up to . . . . .	8 "
Size of driving pulley on countershaft, . . . . .	10 x 5 "
Size of tight and loose pulleys on countershaft, . . . . .	6 x 2½ "
Size of drum on countershaft, . . . . .	16 in. long by 6 in. in diameter.
Size of feed pulley on countershaft, . . . . .	5 x 1½ inches.
Speed of countershaft . . . . .	450 revolutions per minute.
Weight of machine complete with countershaft, . . . . .	600 pounds.

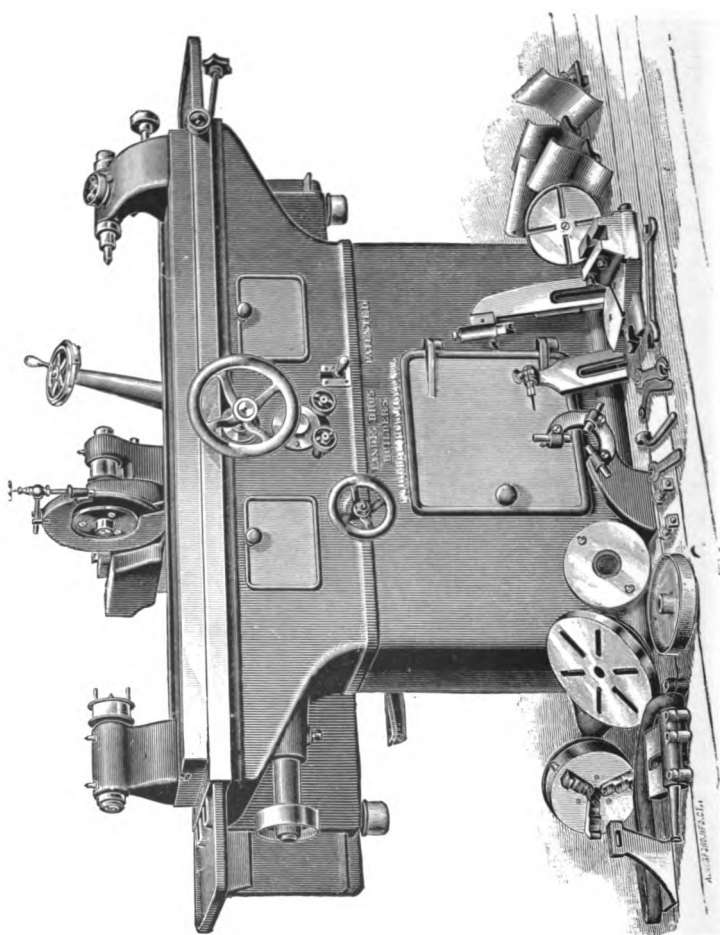
Price . . . . . \$

Same makers also supply a No. 2 Machine 24 in. between centres, and a No. 3, 30 inches between centres.

Price of Machine No. 2, complete with Countershaft, \$

Price of Chuck, extra, fitted to machine. . . . .

*Nos. 2 and 3 Universal Grinding Machine.*



### *Landis Universal Grinding Machines.*

---

THESE machines like some others described in these pages, have but lately been recognized as adapted to general machine shop work, but they are now become a necessity of every well equipped establishment. There is much work that they will do, not only better, but more quickly and cheaply than any other machine.

The *Landis* machines are strong and heavy, built in the finest manner and they have many points of advantage, some of these are :

The fixed position of the table and work, supporting the latter solidly while the *wheel* traverses over it.

The thorough provision for flooding the work with water and for protecting the working parts from same. Accurate work and fine finish can only be attained when the work is prevented from warping with the heat of friction from the emery wheel by great quantities of water, and the "water polish" is the best finish.

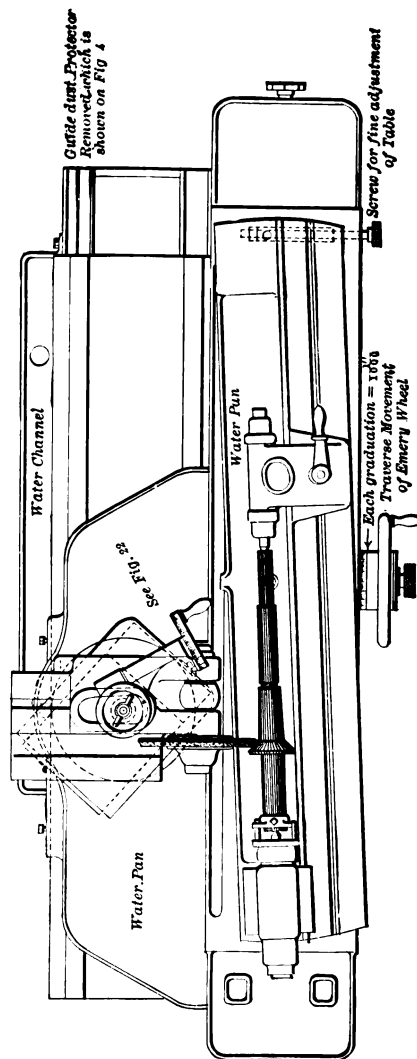
The wide range of adjustment both of speed of work and traverse of emery wheel.

The ease with which adjustments are made and the trueness of adjustment possible. The adjustment of emery wheel for diameter of work is indicated to  $\frac{1}{10,000}$  of an inch. The great taper permitted by the swivel table and many other points of advantage are described in the special catalogue of which a study should be made, and which we will forward on application.

*See details on page 315.*

PLAN OF  
*Landis Universal Grinding Machines.*

SHOWING MACHINE ARRANGED FOR EXTERNAL ANGULAR GRINDING.



## *The Walker Cutter and Tool Grinder.*

*Manufactured by the Norton Emery Wheel Co.*

**T**HIS machine is designed to meet the demand for a general tool grinder, and is adapted for a *wider range* of work than has hitherto been accomplished with a single machine, practically covering with its various attachments the *entire field* of grinding operations on cutters, reamers and other small tools.

It *can be built up* by the addition of new parts as required, thus enabling a customer who only requires a simple machine at first, to add the different parts from time to time and finally secure a complete machine.

**One Unique Feature** of the machine is, that the wheels furnished with it are all mounted upon interchangeable collets ready for instant use, and are easily adjusted without loss of time. They can be screwed instantly upon the projecting tapered end of the spindle *without the use of a wrench*, and by this plan the wheels are always sure to run perfectly true.

**Specially Selected Wheels.**—The wheels that are furnished with the machine are each carefully selected for a special class of work and *can be duplicated* when ordering by referring to the designating numbers and letters on the wheels.

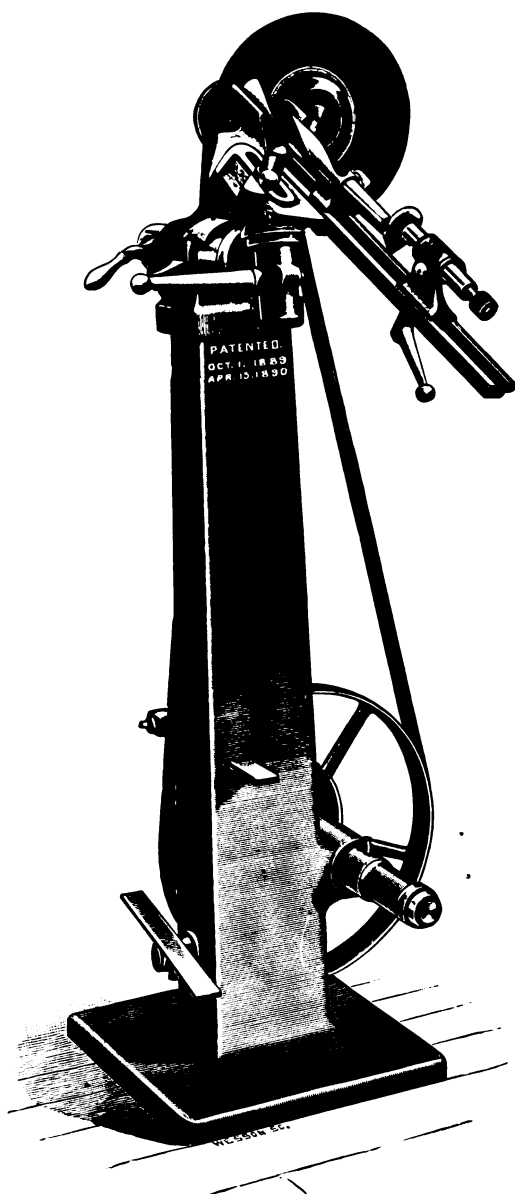
Additional fixtures are provided, adapting the machine for every class of grinding, among others :

The *twist drill grinding attachment*, same as described on next page ; *horizontal and vertical vises* and other attachments for holding work ; *universal angle holder, special lathe and planer tool attachments*, the whole making by far the most complete grinder in the market.

Price, machine as shown in cut opposite, . . . . \$

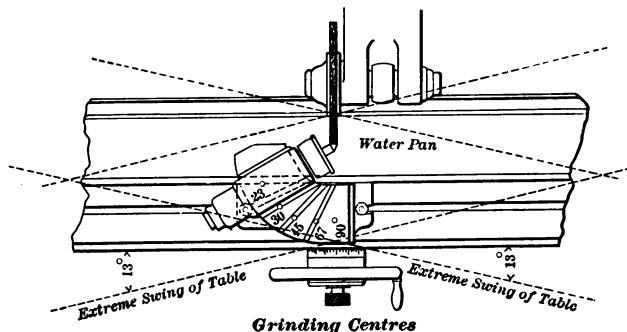
*Special catalogues on application.*

*The Worcester Twist Drill Grinder.*





## *Landis Universal Grinding Machines.*



### **SIZES.**

**No. 2** Machine swings 10 in. diam., takes 30 in. between centres. Tight and loose pulleys 8 in. diam.,  $3\frac{1}{4}$  in. face. 450 revolutions. Weight about 3,000 lbs. Price \$

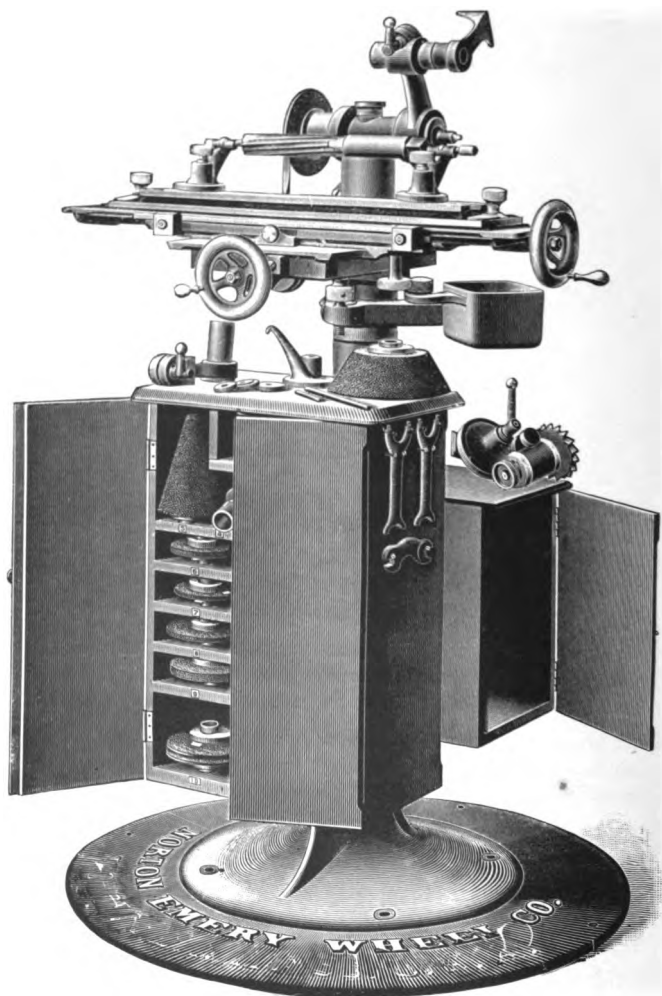
**No. 3** Machine swings 10 in. diam., takes 42 in. between centres. Tight and loose pulleys 8 in. diam.,  $3\frac{1}{4}$  in. face. 450 revolutions. Weight about 3,300 lbs. Price \$

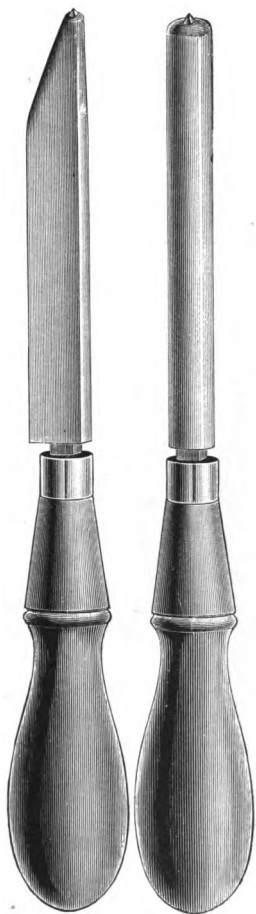
**No. 4** Machine swings 20 in. diam., takes 63 in. between centres. Tight and loose pulleys 12 in. diam.,  $4\frac{1}{4}$  in. face, 375 revolutions. Weight about 8,000 lbs. Price \$

**No. 5** Machine swings 20 in. diam., takes 96 in. between centres. Tight and loose pulleys 12 in. diam.,  $4\frac{1}{4}$  in. face, 375 revolutions. Weight about 9,500 lbs. Price \$

The above sizes of Grinding Machines are also furnished plain for straight and taper shaft grinding only.

*Walker Cutter and Tool Grinder.*





*Hunt's*  
***Black Diamond Trueing Tools.***

For Trueing Emery Wheels.

No. 1. Heavy 6 in., square, price \$

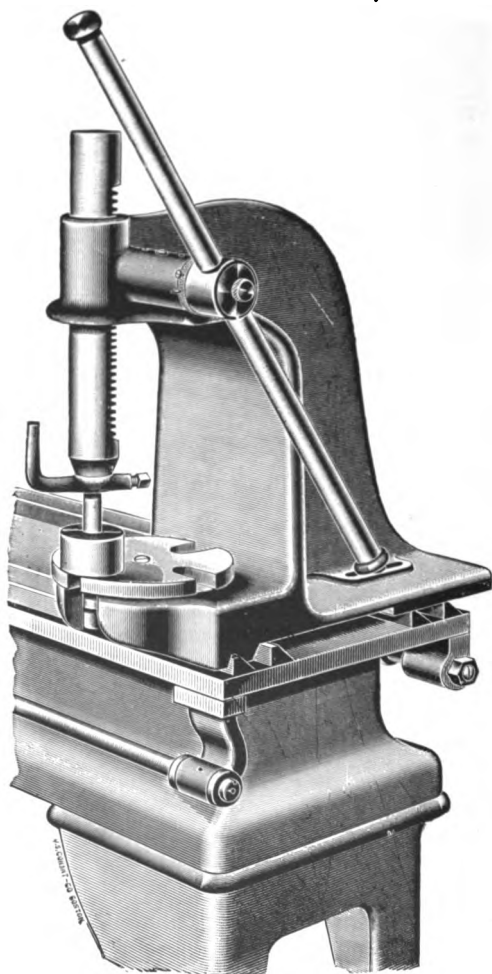
" 2. 5 in., " "

" 3. Ordinary hand tool,  
round . . . . . "

No. 4. Ordinary hand tool,  
for light work only . . . "

No. 5. Ordinary lathe tool . . . "

*The Greenerd Arbor Press.*



### *The Worcester Twist Drill Grinder.*

THE machine we illustrate fully meets all the requirements for machine shops, either large or small. The wheel spindle has a conical bearing extending nearly through the belt pulley, adjustable for wear. The emery wheel is of the cup form, and the drill is applied in such manner that its perfect grinding does not depend at all upon a perfect wheel surface.

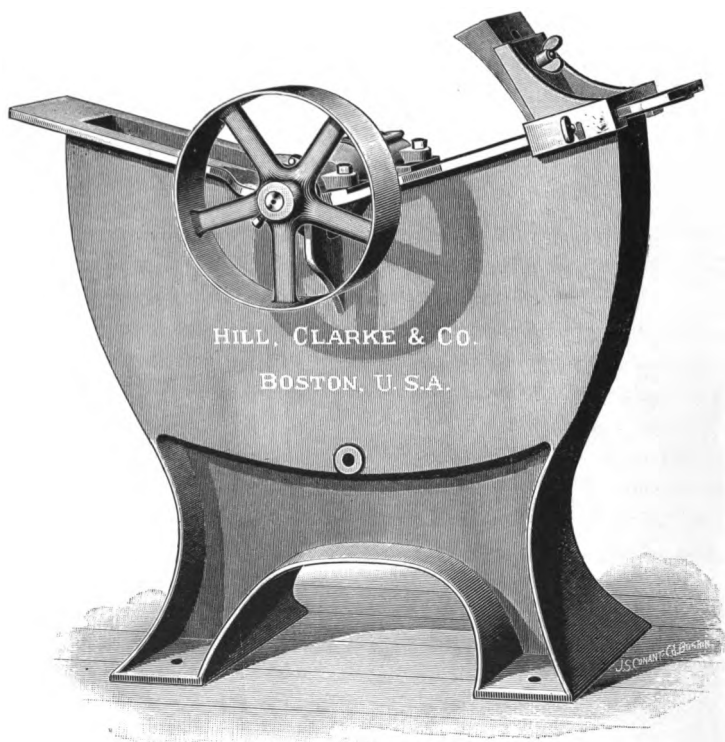
There is no adjustment of chuck holders. With this machine it is only required to drop the drill in place; any size for which the machine is adapted will be held perfectly and ground true with the body of the drill. The rest for the shank of the drill is instantly adjusted to bear on the truest place, and the end stop is adjustable for any standard length of drill down to a mere stub.

A drill point ground on this machine has a helicoidal surface. This is the perfect form for a drill point. The adjustment for drills of various diameters is obtained by an ingenious and very simple combination of angles in the sliding holder, and this is always right when the holder is adjusted to correspond to the diameter of the drill to be ground. This machine grinds the drill to the angle recommended by the leading manufacturers, viz.: 59 degrees.

---

Price, No. 1, $\frac{7}{8}$ to $1\frac{1}{8}$ inches . . . . .	\$
“ “ 2, $\frac{1}{4}$ to 2 “ . . . . .	

## *Grindstone Troughs.*



No. 1 will take a stone  $32 \times 4\frac{1}{2}$ . Size of pulley  $16 \times 3\frac{3}{4}$  inches.  
Speed, 60 revolutions per minute.

Price of frame only . . . . . \$  
 " with stone . . . . .  
 " " and trueing device . . . . .

No. 2 will take a stone  $42 \times 6$ . Size of pulley  $20 \times 4$  inches.  
Speed, 50 revolutions per minute.

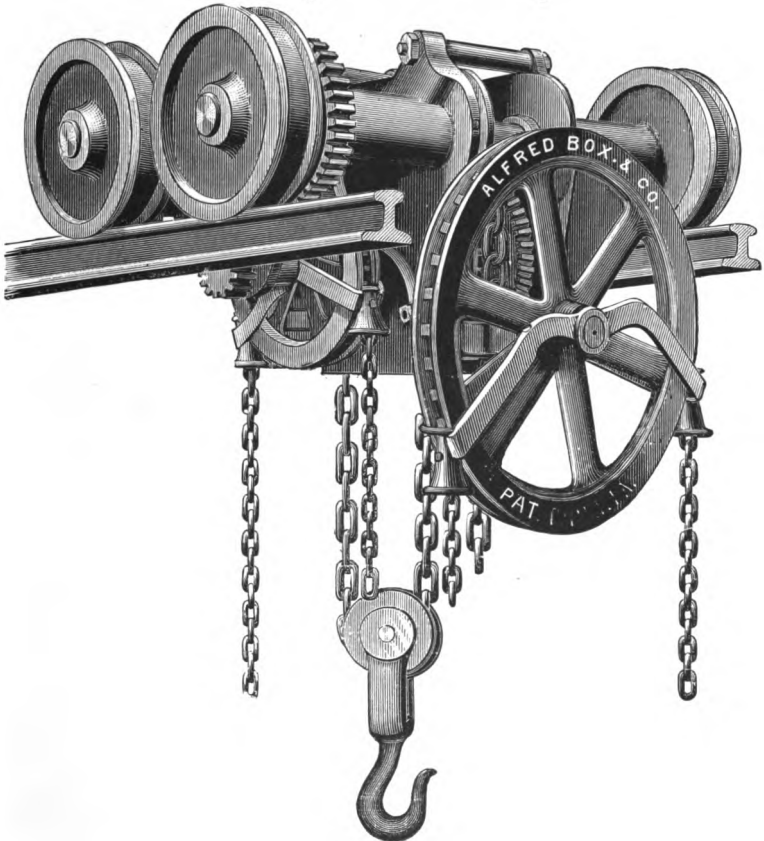
Price of frame only . . . . . \$  
 " with stone . . . . .  
 " " and trueing device . . . . .

## *Combined Hoist and Trolley.*

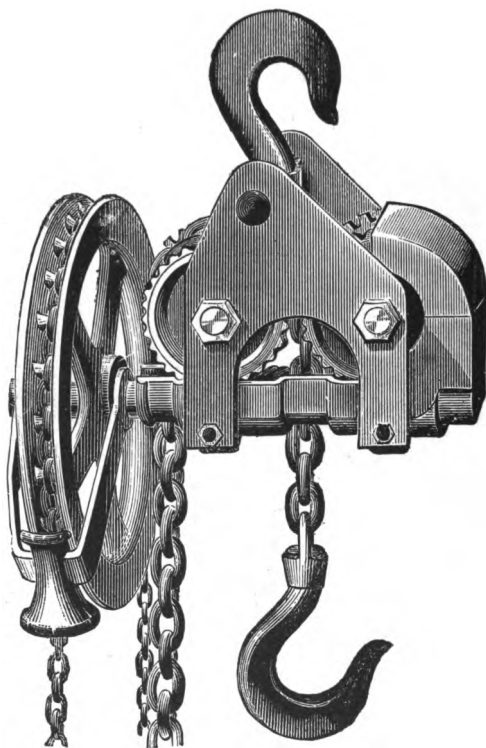
**1 to 30 Tons Capacity.**

*Made by A. Box & Co.*

**T**HESE trolleys are built in the very best manner, tested to a factor of safety far beyond their nominal rating. They have hardened steel roller bearings, and are very largely in use, especially in our electric power and light stations. Prices, according to weight to be lifted and height.



*Box's Portable Double Screw Hoist.*

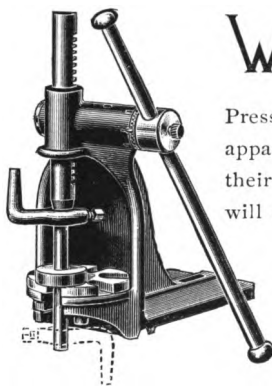


*Details and prices of this Hoist on opposite page.*



## *The Greenerd Arbor Press.*

*Made by C. H. Harlow.*



WE desire to call the attention of machinists to a simple but important invention, The Greenerd Arbor Press. While most of the advantages are apparent to those who now drive in and out their arbors, we think that the following will more fully call to mind the principal advantages of this tool.

### POINTS OF EXCELLENCE.

It saves marring, upsetting or springing the arbors.

It saves cleaning out the centres and taking off the dogs. (See cut.)

Saves defacing or otherwise damaging finished work.

It preserves the arbors and will pay for itself in the increased life of them. Clamping on to the end of the lathe bed, it is always at hand.

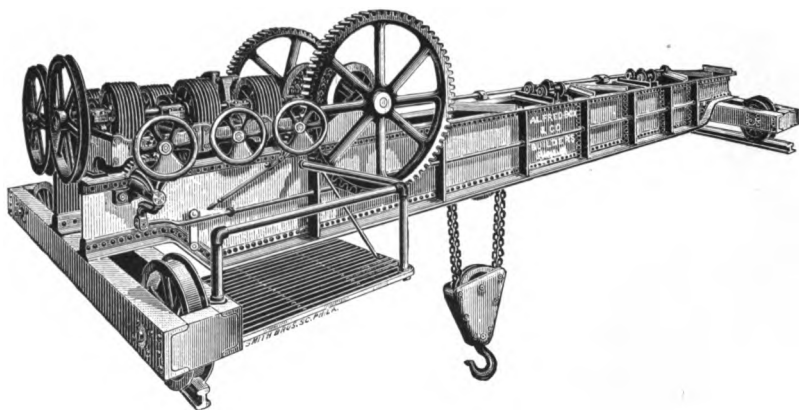
A useful tool in the manufacture of machinery.

Now built in three sizes.

### DETAILS AND PRICES.

	No. 1.	No. 2.	No. 3.
Largest diameter of work . . .	6 inches.	6 inches.	12 inches.
Diameter of arbors . . . . .	1 inch.	1 inch.	1½ inches.
Length of arbors . . . . .	5 inches.	7 inches.	9 inches.
Weight . . . . .	33 lbs.	42 lbs.	90 lbs.
Net price . . . . .			

## *Box Travelling Cranes.*



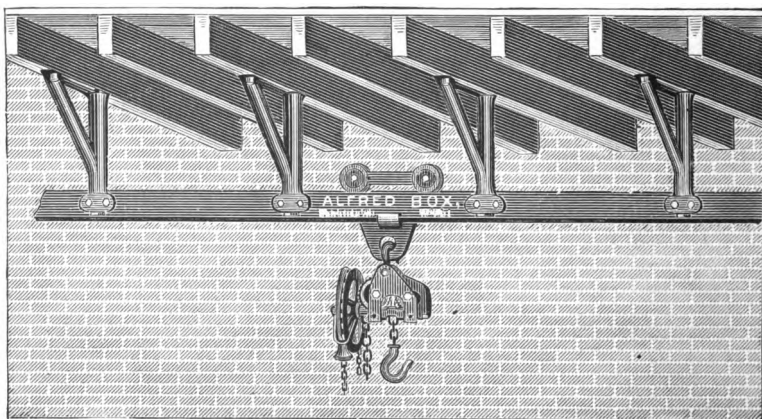
## *Overhead Travelling Cranes.*

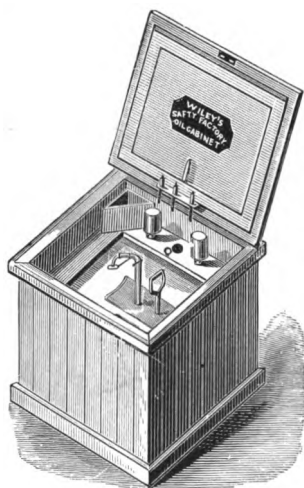
**Operated by Hand, by Rope or Shaft Driving, or by Electricity.**

*Made by A. Box & Co.*



**OVERHEAD single rail tramway. Prices according to weight and other conditions. either with or without rail.**



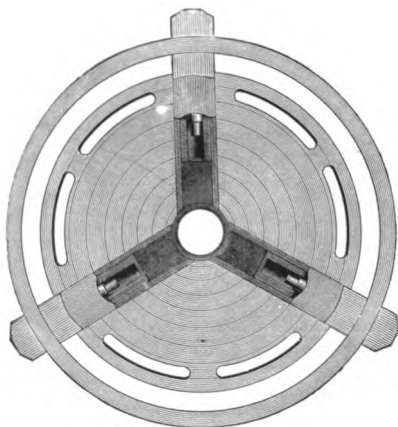
*Wiley's Factory and Mill Oil Cabinets.*

**T**HESE cabinets are of great value in matter of cleanliness, waste, odor, and above all, of safety.

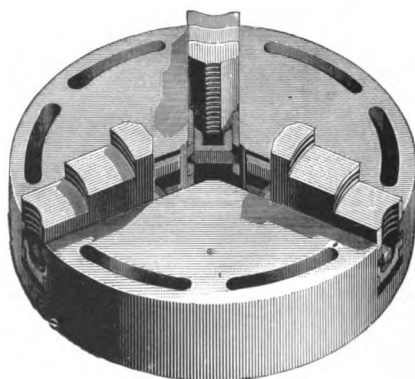
**MILL, RAILROAD AND STEAMBOAT CABINETS.**

Gallons	No. of Compartments.	No. of Barrels.	Size in Inches.	Price.
10	. . . . .	. . . . .	16 x 20	
20	. . . . .	. . . . .	18 x 24	
30	. . . . .	. . . . .	24 x 24	
60	. . . . .	One barrel.	27 x 27	
110	. . . . .	Two barrels.	28 x 41	
120	Two compartments.	Two barrels.	30 x 42	
160	. . . . .	Three barrels.	29 x 60	
170	Two compartments.	Three barrels.	29 x 62	
180	Three compartments.	Three barrels.	31 x 56	
260	. . . . .	Five barrels.	38 x 69	
270	Two compartments.	Five barrels.	38 x 69	

*Wescott's Scroll Combination Lathe Chucks.*



9 inch Chuck, holding a 12 inch Ring.



Chuck, with the Jaws reversed.

*Description and list of sizes and prices on opposite page.*

**Box's Patent Portable Double Screw Hoist.***See cut on opposite page.*

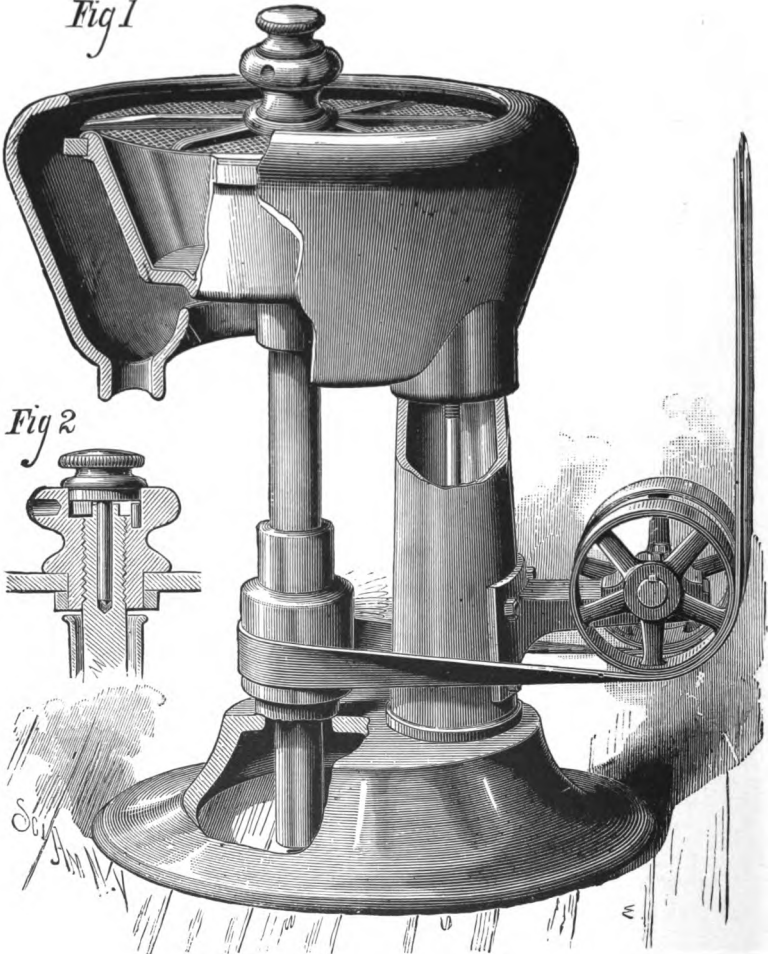
WEIGHT.	LIFT.	TO RAISE.	PRICE.	PRICE PER FOOT, EXTRA LIFT.
25 lbs.	8 ft.	500 lbs.		
35 "	8 "	1,000 "		
50 "	8 "	2,000 "		
80 "	8 "	3,000 "		
100 "	9 "	4,000 "		
120 "	10 "	6,000 "		
140 "	10 "	8,000 "		
180 "	12 "	10,000 "		
240 "	12 "	12,000 "		
340 "	12 "	16,000 "		
450 "	12 "	20,000 "		

Larger sizes up to 40,000 pounds capacity made to order. Duplicate parts furnished on application.

In ordering extra chain, simply say so many feet of "extra lift," which is added to the above allotment. Two single feet of the small hand chain is used to one foot of the large or lifting chain. Two-thirds of the above price is for the large size. If extra chain be ordered, more of one size than the other, prices are in proportion.

# Roper Oil Separator.

Fig 1



**T**HIS machine stands about 30 inches high. Should make about 2,000 revolutions. Has within it a removable pan to hold chips or turnings to be drained. It will pay for itself in a short time in any shop of moderate size.

Price, with countershaft, . . . . . \$

**Westcott's Scroll Combination Lathe Chucks.**

BOTH INDEPENDENT AND UNIVERSAL.

**T**HE improvement consists in not only making the jaws reversible, by which arrangement the small-sized chucks can be used with facility in holding screws, pipes and drills, but also in making them act independently of each other, when required, as well as to act concentrically and simultaneously. This chuck is therefore enabled to seize, and hold firmly, round, oval, oblong or eccentric shapes.

The cut at the top of opposite page shows the great capacity of this style of chuck. It represents a 9 inch chuck holding a 12 inch ring. This position admits of turning on face and inside of ring. The jaws are supported on steel "boxes," which makes it possible for this style of chuck to hold larger work for its diameter than any other chuck made. The holes through the body are to lighten the chuck, and also for convenience in strapping work to the chuck.

When the jaws are reversed, as shown in cut at bottom of opposite page, they get a long bite on the work, and hold very firmly.

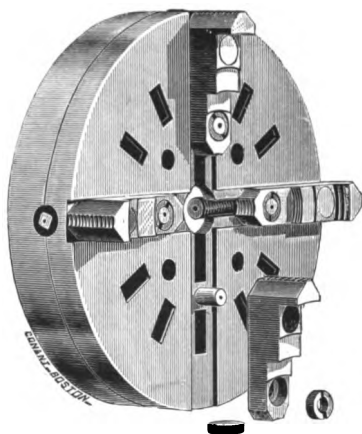
Machinists appreciate a chuck like this for holding bolts and shafting which have no centers in them.

**LIST OF SIZES AND PRICES.**

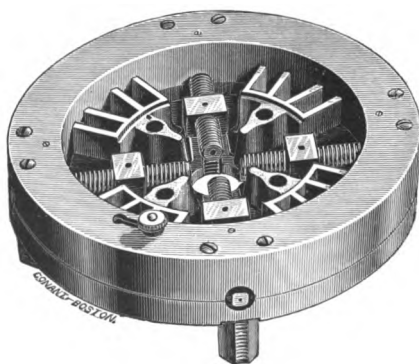
DIAMETER OVER ALL.	WILL HOLD INSIDE JAWS.	DIAMETER OF CENTER HOLE.	PRICE, 3 JAWS.	PRICE, 4 JAWS.
4 <sup>3</sup> / <sub>8</sub> inch.	5 <sup>1</sup> / <sub>2</sub> inch.	<sup>7</sup> / <sub>8</sub> inch.		
7 <sup>1</sup> / <sub>2</sub> "	8 "	1 "		
10 <sup>1</sup> / <sub>8</sub> "	12 "	1 <sup>1</sup> / <sub>4</sub> "		
13 <sup>3</sup> / <sub>4</sub> "	15 "	1 <sup>1</sup> / <sub>2</sub> "		
16 "	18 "	1 <sup>1</sup> / <sub>2</sub> "		
18 <sup>1</sup> / <sub>2</sub> "	21 <sup>1</sup> / <sub>2</sub> "	2 "		
21 <sup>1</sup> / <sub>4</sub> "	26 "	2 <sup>1</sup> / <sub>4</sub> "		
24 "	30 "	2 <sup>1</sup> / <sub>4</sub> "		
30 "	36 "	-		
36 "	43 "	-		

The center hole in most sizes can be made larger if required.

*Westcott's*  
*Patent Geared Combination Lathe Chuck.*



Front view of 15-inch Chuck, showing the manner of reversing the Jaws.



Back view, showing shifting Stud and Nut. Also recess for Face Plate.

*Description and list of sizes and prices on opposite page.*



***Westcott's Geared Combination Lathe Chuck.******INDEPENDENT, UNIVERSAL, ECCENTRIC, JAWS REVERSIBLE.***

THE jaws are of steel, carefully hardened and ground. The gears, pinions, screws, and keys are all made of tough steel of the best quality.

The jaws of this chuck are quickly set true by running them out to the rim; and, when mark on end of screw is in line with mark on body of chuck, the shifting stud is slipped into place. Then the chuck is right without testing, as would have to be done in other chucks.

On sizes from 12 inches up, holes extend through the body for convenience in bolting work to the chuck.

**LIST OF SIZES AND PRICES.**

DIAMETER.	WILL HOLD IN- SIDE OF JAWS.	THREE JAWS.	FOUR JAWS.
5 inch.	5 inch.		
7½ "	7½ "		
10⅛ "	10⅛ "		
13 "	13⅛ "		
15¼ "	17 "		
18 "	19¾ "		
21 "	25½ "		
24 "	28 "		

The shells of these chucks have been enlarged to cover the screw-heads; and it is this which makes the odd diameters, like 10⅛, etc. These chucks, 10⅛-inch, 13-inch, etc., will swing in any lathe where the 9-inch and 12-inch of any other make of chucks, with projecting screw-heads, will swing. In these chucks the jaws are ground both on the top and bottom, giving a more perfect bearing surface than can be obtained in any other chuck.

*Wescott's*  
*I. X. L. Independent and Reverse Jaw Chucks.*



### *Westcott's*

#### *I. X. L. Independent and Reverse Jaw Chuck.*

**T**HIS chuck is stronger than any other independent chuck. Its superior strength is based principally upon the fact that the end thrust is brought to bear on chuck body at its strongest points, this result being accomplished by the intervention of screw carriers which form the novel feature of the I. X. L. chuck.

Each carrier is fastened by a long set screw, one-half of which engages with carrier, the other half with body of chuck. These screw carriers or bearings are made of steel.

The arrangement of parts is such that when the I. X. L. is required to hold work larger than its diameter the full bearing of screw in jaw is retained. The I. X. L. thus has greater *capacity* than any other Independent of same size.

Jaws are made to reverse.

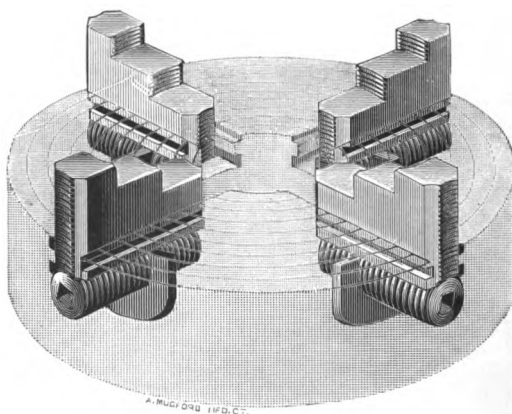
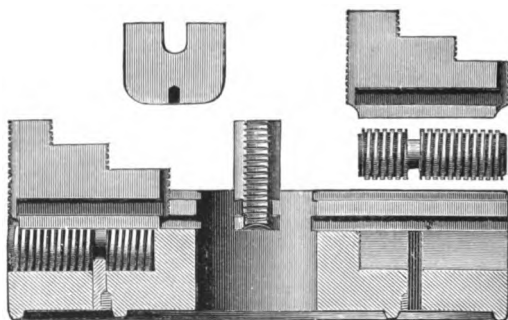
Every operation of the I. X. L. chuck is performed with convenience.

Screw heads do not project to mutilate operative's hands.

The I. X. L. possesses many other important features appreciated by machinists.

## *Whitton's Independent Jaw Chuck.*

WITH REVERSIBLE JAWS.



*Description and list of sizes and prices on opposite page.*

**Whiton's New Independent Reversible Jaw Chuck.**

PATENTED SEPT. 13, 1887.

**T**HE improved arrangement of parts in this chuck is clearly shown in the cuts on opposite page.

The screws, which are of large diameter, are grooved or necked down near the center, and are held in place in the chuck by a steel plate having a U-shaped bearing, as shown. This plate is fitted to a groove in the frame of the chuck, and inserted from the back side after the screw is in place. It is thoroughly hardened, and receives all the thrust of the screw.

The screws do not project, but have square recesses in their outer ends to receive the wrench, which is more easily applied in this way than when the recess is in the wrench, because both squares are always in sight.

The following advantages are obtained in these chucks :

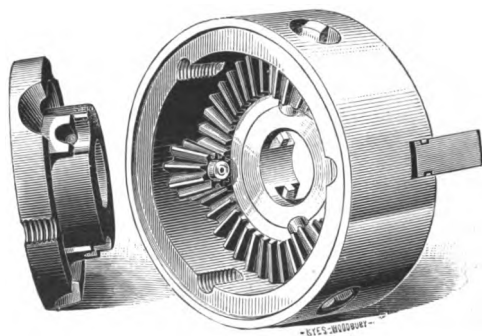
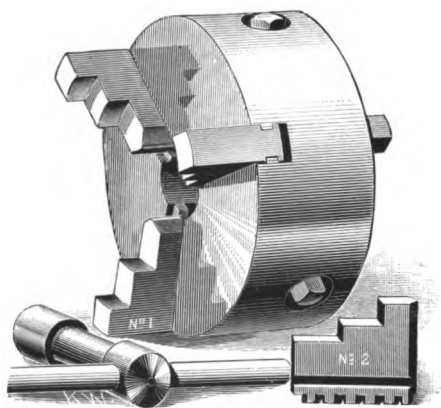
1. The screw thread extends fully to the outside of the chuck, so that the jaw has greater traverse than in other independent chucks, and work larger than the diameter of the chuck may be safely held.
2. The entire thrust of the screws in gripping the work is received on hardened steel shoulders, which are very durable.
3. The screws may be easily removed if desired, but are held in place in the chuck, so that they will not fall out, or become at all displaced, when the jaw is removed.
4. Should the jaw and screw become stuck together from any cause, they can be removed from the chuck and separated without injury.

The jaws, which are made from bar steel, are carefully hardened, and in all the sizes can be easily reversed.

**LIST OF SIZES AND PRICES.**

DIAMETER.	DIAMETER OF CENTER HOLE.	DIAMETER OF FACE PLATE.	DIAM. CHUCK WILL HOLD.	PRICE.
6 inch.	1 $\frac{5}{8}$ inch.	3 $\frac{3}{8}$ inch.	7 $\frac{1}{2}$ inch.	
7 $\frac{1}{2}$ "	2 $\frac{1}{8}$ "	4 $\frac{7}{8}$ "	9 $\frac{3}{4}$ "	
9 "	2 $\frac{5}{8}$ "	4 $\frac{1}{2}$ "	11 $\frac{3}{4}$ "	
12 "	2 $\frac{7}{8}$ "	6 $\frac{1}{8}$ "	15 "	
15 "	3 $\frac{1}{8}$ "	7 "	18 "	
18 "	3 $\frac{3}{8}$ "	8 $\frac{1}{8}$ "	21 $\frac{1}{2}$ "	
21 "	3 $\frac{5}{8}$ "	8 $\frac{3}{4}$ "	24 $\frac{1}{2}$ "	
24 "	3 $\frac{7}{8}$ "	8 $\frac{7}{8}$ "	27 $\frac{1}{2}$ "	

*Whiton's Geared Scroll Chucks.*



*Description and price list of these Chucks on opposite page.*

**Whiton's Geared Scroll Chuck.**

1884 PATENT.

**T**HE distinctive difference between these and other geared scroll chucks consists in making the front plate or body carrying the scroll and jaws of *one piece only*, which is also directly attached to the face plate. The body of the chuck is thus made without any joint, and is very deep under the jaw, so that there is no danger of breakage *from the corner of the slot to the joint*.

Breakages frequently occur here in other geared scroll chucks; and the increased strength of this chuck at this point is a very great advantage.

The chuck has three pinions, which are inserted from *the inside*, after the scroll is in place. Thus the wear is so distributed that the working parts will last much longer than in the old style, and the chuck is always ready to receive the wrench in whatever position the lathe may stop. The materials and workmanship are excellent throughout, and the parts interchangeable. After being hardened, the jaws of each chuck are ground in the center, and every chuck carefully tested.

*These chucks are fully warranted.* If any part breaks because of flaw or faulty material, new parts will be sent on receipt of broken sample. If any chuck when new, and properly fitted to a true lathe spindle, does not run true, it will be replaced by one that does, on receipt of imperfect chuck at factory, with letter of explanation.

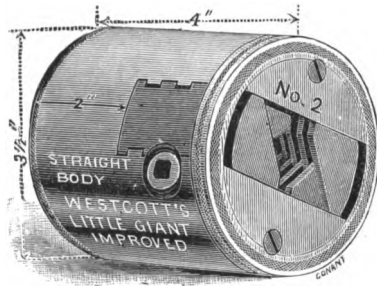
Three or four jaw chucks, having No. 1 or No. 2 jaws, or both sets, or inside jaws, are furnished as desired. Special jaws to drawing are also furnished at the extra cost of stock and labor.

**PRICE LIST.**

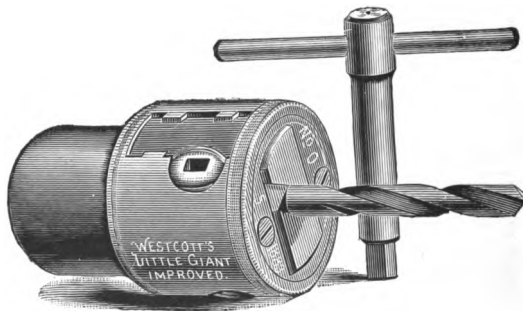
DIAMETER.	DIAMETER OF HOLE.	WEIGHT.	PRICE, 1 SET JAWS.	PRICE, 2 SETS JAWS.
2½ inch.	⅝ inch.	2 lbs.		
3 "	⅞ "	3 "		
4 "	1 "	6 "		
5 "	1¼ "	8½ "		
6 "	1⅝ "	12½ "		
7½ "	2⅛ "	20 "		
9 "	2⅜ "	35 "		
12 "	4 "	60 "		

Add ten per cent for four jaws.

*Little Giant Drill Chucks.*



Straight Body Drill Chuck.



*Description and price list of these Chucks on opposite page.*



***Westcott's Improved Little Giant Drill Chuck.***

**T**HIS chuck has no projections. The jaws and screws are all within the body. The jaws are of the best tool steel, carefully hardened.

A guard ring prevents the jaws from being opened so as to take in larger work than is designed for the chuck. It is very powerful, and is guaranteed to hold true, and not to injure or shear the finest drill. It holds round or square work, and there is no chuck equal to it for holding wood-boring tools. The hole in the hub is made to fit the Morse taper, but can be bored out and threaded to suit the customer's template at a small cost.

The jaws are guided by three strong gibs, which prevent their canting when taking a short bite.

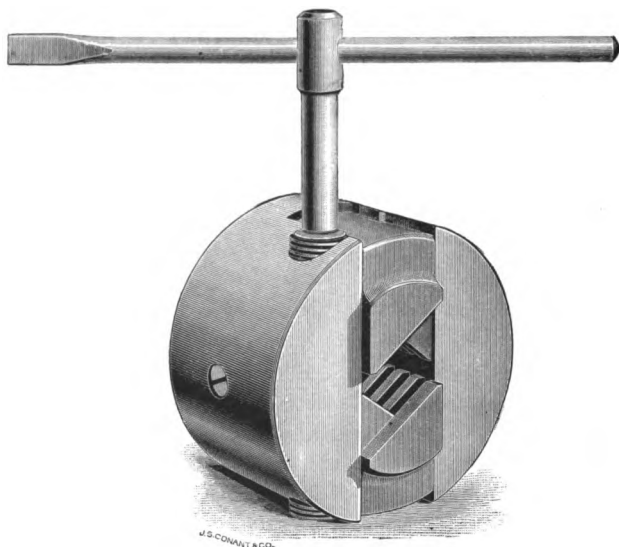
Straight body chucks are kept in stock. These are especially adapted for hollow spindle lathes, for holding rods, round or square which are to be turned or cut off. (See cut at top of opposite page.)

**PRICE LIST OF LITTLE GIANT CHUCKS.**

No.	DIAMETER.	HOLDING DRILLS.	PRICE.
00	1 $\frac{1}{4}$ inch.	0 to $\frac{1}{4}$ inch.	
0	2 $\frac{1}{4}$ "	0 to $\frac{1}{2}$ "	
1	2 $\frac{3}{4}$ "	0 to $\frac{3}{8}$ "	
2	3 $\frac{1}{2}$ "	0 to 1 "	
2 $\frac{1}{2}$	4 "	0 to 1 in., ex. strong.	

**A SUGGESTION.** — If you wish to cut a thread in the hub of the Little Giant Chuck for lathe spindle, do not by any means hold the chuck in another chuck, but screw the jaws down upon a perfectly true live center.

# *No. 4 Little Giant Drill Chuck.*



*Price and description of this Chuck on opposite page.*

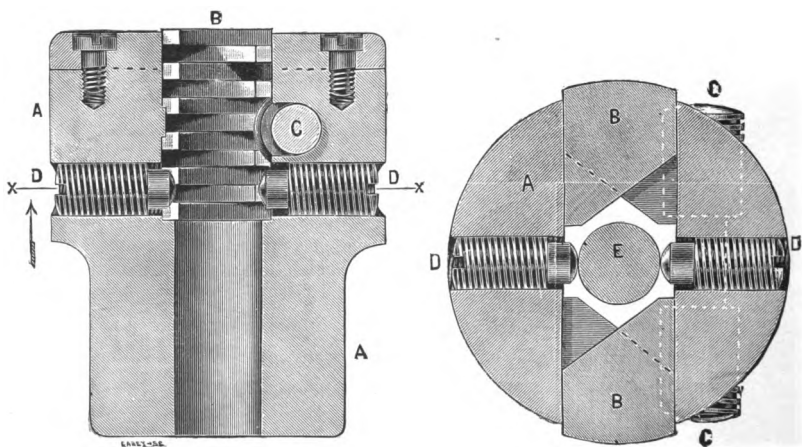


Illustration of manner of using the Side Screw as applied to the Nos. 2, 2½, 3, and 4 Little Giant Drill Chucks. For instructions as to its use, see opposite page.

**Nos. 3 and 4 Little Giant Drill Chucks.***Made by The Westcott Chuck Company.*

**T**HESE chucks were designed for special work, but have found a very rapid sale for use on large upright drills, cutting-off machines, turret lathes and screw machines, taking the place of the more expensive lathe chucks.

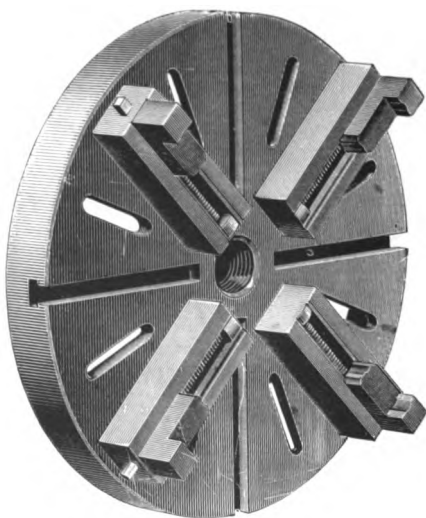
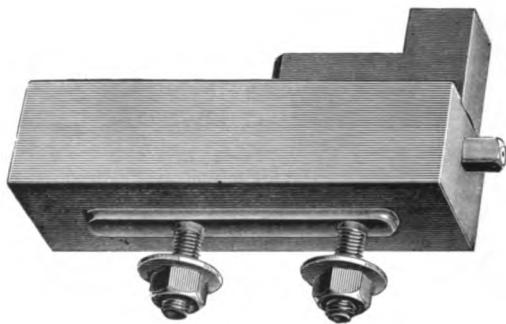
They are intended to be fastened to face plates, and four screws are furnished for the purpose.

These chucks have also the Westcott Patent Side Screw (shown in cuts at bottom of opposite page), an auxiliary help to hold work where the strain is unusually heavy. After closing the jaws down upon the work, then, if doing heavy work, set up the independent screws. This gives double holding power. In the Nos. 2 and  $2\frac{1}{2}$  the screws reach to  $\frac{5}{8}$  inch, in the No. 3 to  $\frac{3}{4}$  inch, and in the No. 4 to 1 inch drills. When using smaller drills, the screws must be drawn back out of the way to let the jaws pass.

**PRICES.**

NO.	DIAMETER.	HOLDING.	PRICE.
3	6 inch.	0 to $1\frac{1}{2}$ inch.	
4	$6\frac{1}{2}$ "	0 to 2 "	

*Independent Chuck Jaws.*



Face Plate with Chuck Jaws in position.

*Price and description of these Chuck Jaws on opposite page.*

### *Independent Chuck Jaws.*

*Made by the American Twist Drill Co.*

**T**HE jaw is made of wrought-iron or steel, and case hardened. The screws are made of steel. The large sizes have two or more bolts to fasten them to the face plate. The jaws can be fixed in any desired position, so as to hold pieces of any irregular form. The jaws can be quickly attached to the face plates of lathes, drilling and boring machines, also to the platen of planers and milling machines, making a superior chuck that will firmly hold pulleys, gearing, or any class of work with regular or irregular forms.

The small jaws will hold smallest work, and the large sizes down to 2 inches in diameter.

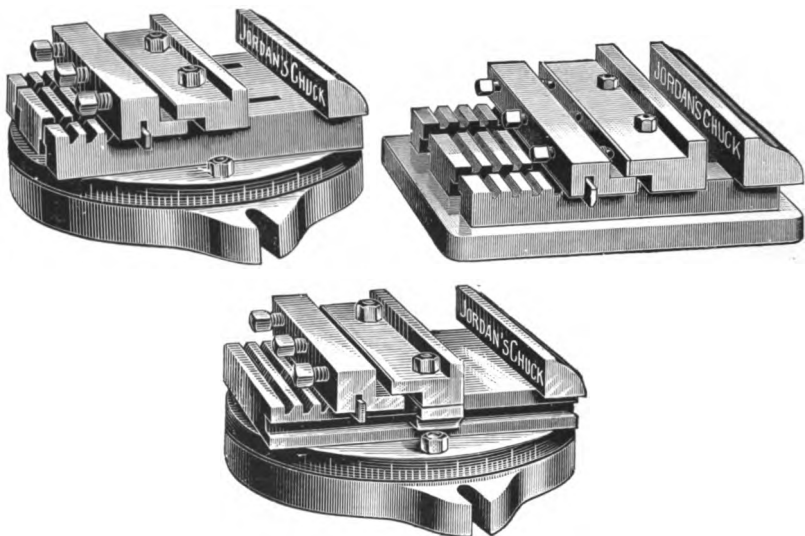
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Price, No 1, chuck jaw, 4½ inches long	. . . \$
“ “ 2 “ “ 8 “ “	. . .
“ “ 3 “ “ 9½ “ “	. . .

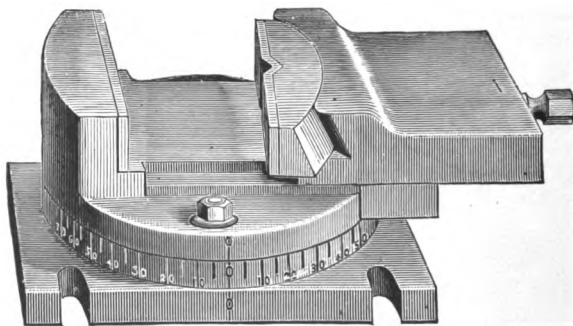
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*Price for larger or smaller sizes upon application.*

*Jordan's Improved Planer Chucks.*



*Stephens Planer Chucks.*



GRADUATED SWIVEL BASE.

*List of prices of these chucks on opposite page.*

# Jordan's Improved Patent Planer Chucks

## DETAILS AND PRICES, EITHER STYLE.

ROUND BASE.						SQUARE BASE.					
Length of jaw.	Jaw will open.	Weight of chuck.	Distance required between planer posts to take chuck.	Diam. of base.	Price.	Length of jaw.	Depth of jaw.	Jaw will open.	Weight of chuck.	Distance required between planer posts to take chuck.	Price.
8	5	94	14 in.	11 $\frac{3}{4}$		8	1 $\frac{7}{8}$	5	76	13 $\frac{1}{2}$ in.	
10	6	128	15 $\frac{1}{2}$ "	13 $\frac{1}{2}$		10	2 $\frac{1}{4}$	6	100	15 "	
12	7	158	17 $\frac{1}{2}$ "	16		12	2 $\frac{1}{4}$	7	140	17 "	
15	9 $\frac{1}{2}$	251	21 "	18		15	2 $\frac{1}{2}$	9 $\frac{1}{2}$	151	20 "	
18	11	277	24 "	19 $\frac{1}{2}$		18	2 $\frac{5}{8}$	11	194	23 "	
24	16	475	29 "	25		24	2 $\frac{5}{8}$	16	300	28 "	
30	21	575	34 "	31		30	2 $\frac{3}{4}$	21	400	32 "	

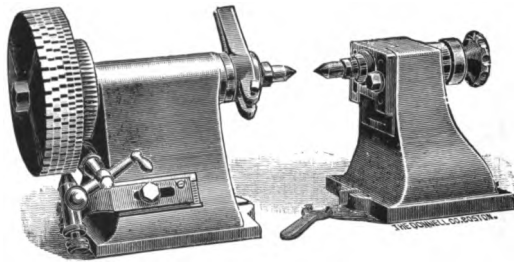
# Stephens' Patent Planer Chucks.

WITH SELF-ADJUSTING TAPER ATTACHMENT. FLAT AND SWIVEL BASES.

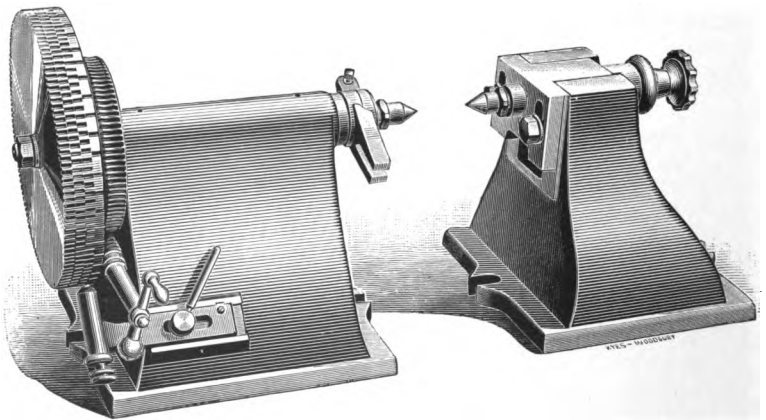
See cut at bottom of opposite page.

WIDTH OF JAW.	DEPTH OF JAW.	JAW OPENS.	PRICE, FLAT BASE.	PRICE, SWIVEL BASE.
6 inch.	1 $\frac{1}{4}$ inch.	6 inch.		
8 "	1 $\frac{1}{2}$ "	8 "		
10 "	2 "	10 "		
12 "	2 $\frac{1}{2}$ "	12 "		
15 "	2 $\frac{1}{2}$ "	13 "		
20 "	3 "	16 "		

*Improved Planer Centers.*



13-inch Swing Planer Centers.



20-inch Swing Planer Centers.

*Prices and description of these Centers on opposite page.*



### 13 Inch Swing Planer Centers.

*See cut at top of opposite page.*

**T**HESE centers are provided with an improved index consisting of five circular plates or disks, each  $\frac{7}{8}$  inch thick and  $7\frac{1}{4}$  inches diameter, which are accurately cut with 44, 52, 56, 90, and 96 notches, respectively, giving a wide range of divisions. These plates are readily taken off and others substituted, with different numbers for special work. These plates, being cut through like a gear, admit of the use of a much stronger pin than a drilled index. This index is revolved by means of a worm and gear, which are readily disconnected (by loosening one bolt) when not required.

The spindles, worm, and screw are of steel.

**Swing, 13 inches. Weight, 85 pounds.**

Price . . . . . \$

### 20 Inch Swing Planer Centers.

*See cut at bottom of opposite page.*

**T**HESE centers are designed for heavy work, and are provided with an improved index consisting of four circular plates or disks, each  $\frac{7}{8}$  inch thick and 12 inches diameter, which are accurately cut with 48, 110, 126, and 140 notches respectively, giving a wide range of divisions; and these plates are readily taken off and others substituted, with different numbers for special work. These plates, being cut through like a gear, admit of the use of a much stronger pin than a drilled index. This index is revolved by means of a worm and gear, which are readily disconnected (by loosening one bolt) when not required.

The spindles, worm, and screw are of steel.

**Swing, 20 inches. Weight, 210 pounds.**

Price . . . . . \$

## *Standard Babbit Metal.*

**G**ENUINE.—Which we guarantee to be made in strict accordance with the “original” Babbit formula, and which is acknowledged by all to be the best possible mixture for extremely high-speeded, or exceptionally heavy machinery.

**EXTRA.**—The same in general appearance as above, and is, in fact, the same mixture with a small portion of lead added to it (the softness of which is offset by an increase of antimony). While this serves to cheapen the price, it works no detriment to the quality, as the lead has a faculty of holding the oil to the bearing instead of shedding it, as is the case with a metal composed almost entirely of tin. This will do any work for which a Genuine Babbit Metal is required.

**No. 1** is a metal we have handled very successfully for a number of years. It does good work in almost any capacity, is rich in copper, and is therefore more durable than many metals sold for double the price by others. Suitable for heavy, slow-speeded, or light, high-speeded machinery, light engine work, heavy and high-speed shafting, shop work, etc., etc.

**M.**—This is a good medium grade, and fully equal to some metals sold at much higher prices.

**A.**—This is the cleanest, best refined, low priced metal in the market, and runs as freely as the best metals made. Is a great favorite with many of our largest New England manufacturers. Suitable for light shop work, caps for heavy journals, shafting, repairing, etc., etc.

**No. 4** is the best cheap Babbit Metal in the market. We guarantee it to contain 1 per cent. of copper and not less than 16 per cent. of antimony. Specially recommended to Shoe Machine manufacturers.

We guarantee all of the above to be made entirely of new materials, free from dirt and dross, to be thoroughly mixed by improved machinery, and we guarantee satisfaction where used for appropriate work. All of our metals are branded “H. C. & Co., Boston,” and we caution the trade to beware of imitations.

We carry in stock and quote for immediate shipment:

	By the Box, 50 pounds.	For Less Amount.
<b>Genuine</b> . . . . .	cts. . . . .	cts.
<b>Extra</b> . . . . .	“ . . . . .	“
<b>No. 1</b> . . . . .	“ . . . . .	“
<b>M</b> . . . . .	“ . . . . .	“
<b>A</b> . . . . .	“ . . . . .	“
<b>No. 4</b> . . . . .	“ . . . . .	“

Prices subject to change without notice from day to day.

*Special quotations for large amounts*

## SPECIAL NOTICE.

WE CARRY IN STOCK A  
FULL ASSORTMENT OF THE FOLLOWING  
SMALL TOOLS:—

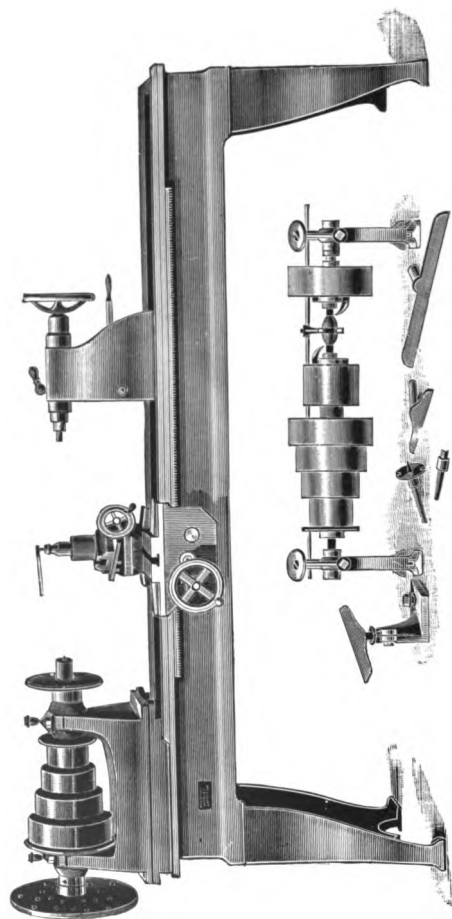
MORSE TWIST DRILLS,  
MORSE DRILL SOCKETS,  
MORSE REAMERS,  
ADJUSTABLE AND EXPANDING  
REAMERS,  
MACHINISTS' HAND TAPS,  
MACHINE NUT TAPS,  
MACHINE SCREW TAPS,  
PULLEY TAPS,  
SCREW PLATES,  
TAP WRENCHES,  
LATHE TOOLS,  
CUTTING-OFF TOOLS,  
MILLING CUTTERS,  
LATHE DOGS,  
CHUCKS,  
LATHE CHUCKS,

DRILL CHUCKS,  
PLANER CHUCKS,  
CHUCK JAWS,  
VISES,  
FORGES,  
BOLT HEADING MACHINES,  
FLUE HOLE CUTTERS,  
CENTERING MACHINES,  
GRINDING MACHINES,  
GRINDSTONE DRESSERS,  
GRINDSTONE FRAMES,  
RATCHET DRILLS,  
LIGHT DRILLING MACHINES,  
PORTABLE DRILLING MACHINES,  
PORTABLE HOISTS,  
POUNDING BLOCKS,  
MANDRELS, ETC.

*Discounts quoted on application.*

*Pattern-Maker's Lathe, 24 Inches Swing.*

WITH COMPOUND CARRIAGE.



*Price and description of this machine on opposite page.*

## ***Pattern-Makers' Machines***

**A**RE now a necessary part of a machine shop. The machines we illustrate on these and the following pages are thoroughly well made, and contain many points of advantage for pattern work.

## ***Pattern-Makers' Lathes.***

**66-inch Sliding Gap Lathe.** A very powerful tool for heavy work. *Photograph and price on application.*

**41-inch swing.** Same details as 24-inch described below

**Price on 12-foot bed . . . . . \$**

**24-inch Pattern-Maker's Lathe.** (*See cut opposite.*) A very complete and perfect tool. This machine has hand rack feed and compound rest. The head swivels for convenience in turning drafts on patterns chucked on face plate. Tail-stock sets over for turning tapers. The tool has rear face plate and outer rest. Two speeds to counter, the slower one for rear face plate turning.

**16-inch Pattern-Maker's Lathe.** Same style as 24-inch, except it has plain rest and head stock does not swivel.

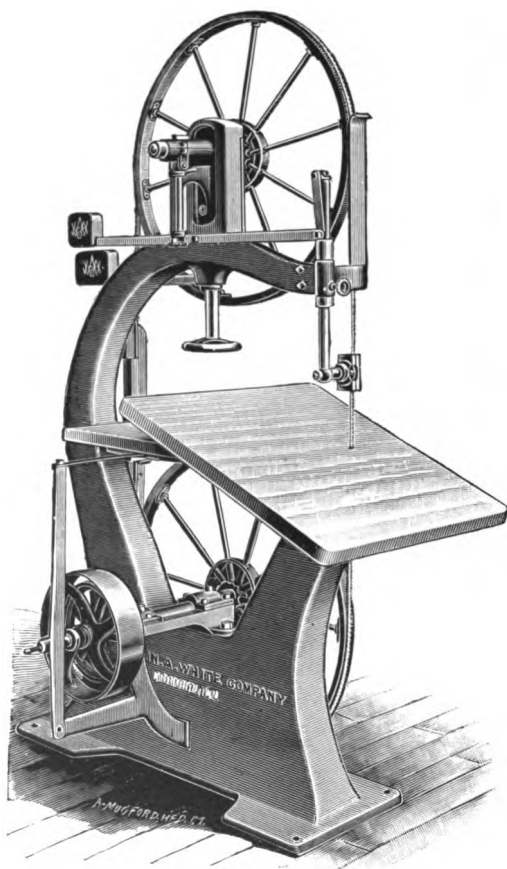
**Price 24-inch  $\times$  8-foot lathe with tripod and countershaft . . . . . \$**

**Price per foot, extra . . . . .**

**" 16-inch  $\times$  8-foot lathe . . . . .**

**" " per foot, extra . . . . .**

*Dover Band Saw.*



### *The Dover Band Saw.*

*Made by the John A. White Company.*

---

**T**HE table of wood or iron tilts to angle of 30°.

Wheels 36 inches in diameter, of novel construction, extremely light and strong, rubber covered.

Upper box adjustable. Saw tension by weighted lever. Saw guides of anti-friction disc pattern.

The driving pulley, is a friction clutch, stopped and started by a handle from the front.

Every part of first-class stock and interchangeable. Workmanship the best possible.

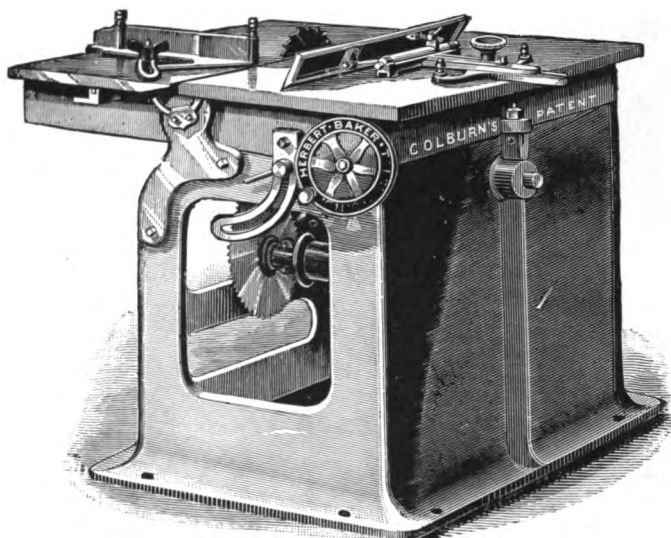
Price, . . . . . \$

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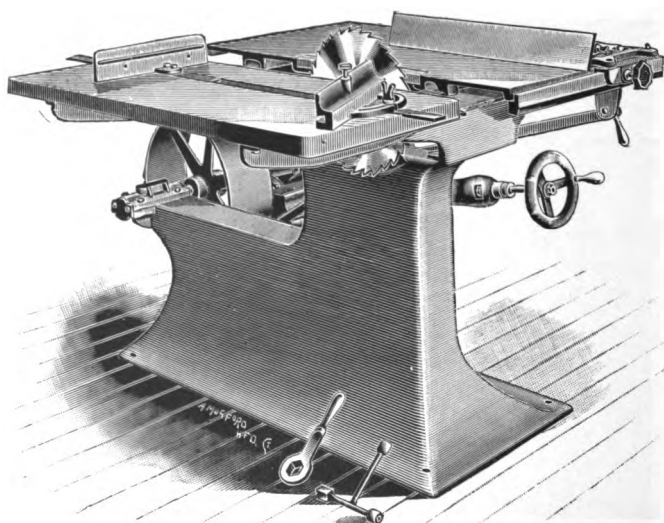
We also supply a much heavier machine, box pattern frame, for heavy work.

Price, . . . . . \$

*Colburn Saw Bench.*



*Gordon Saw Bench No. 2.*





### *The Colburn Universal Saw Bench.*

**O**NE of the most complete machines of the kind. It has two adjustable saws. The left half of table slides on friction rollers. The whole table tips on the housing to any desired angle. Table, 38 x 36½ inches; will carry two 12-inch, or one 9 and one 16-inch, or single 18-inch saw.

Countershaft pulleys 8 x 6 inches. 800 revolutions.

Price with countershaft . . . . . \$

### *Gordon Saw Bench No. 1.*

*Made by the John A. White Company.*

**A** SIMPLE substantial machine with adjustable table 42 x 38 inches with removable centre strip for grooving heads, will carry 16-inch saw.

Countershaft pulleys 8 x 4 inches. 650 revolutions. Weight, 500 pounds.

Price. . . . . \$

### *Gordon Saw Bench No. 2.*

*Made by the John A. White Company.*

**T**HIS is a heavier machine with several new features. Will take saw to 18 inches. Saw adjusts by hand wheel in front. Left side of table slides sideways to make room for dado head.

Counter attached to machine has combined friction and idler pulley. Handle at right of machine starts and stops it by touch of finger.

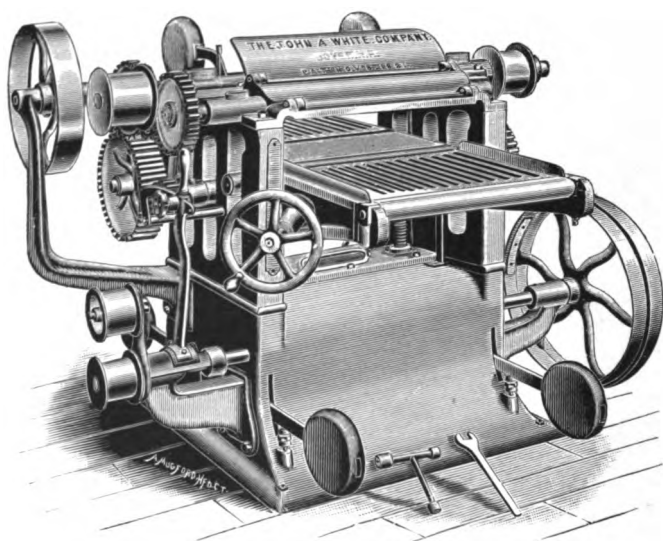
Weight 1,000 lbs. Price, iron table . . . . . \$

Wood top 800 " " wood " . . . . .

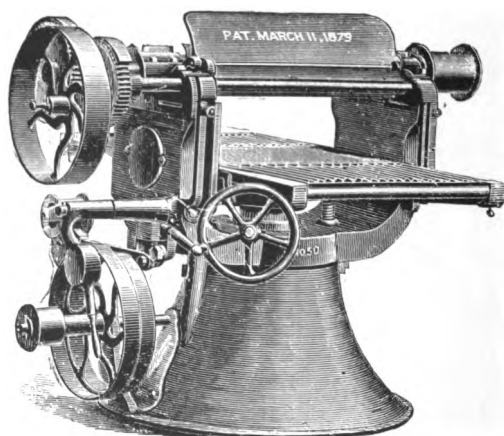
Same machine made with double saw.

Weight 1,500 lbs. Price, iron top. . . . . \$

*Improved Concord Planer.*



*Gordon Planer.*



***Improved Concord Planer.****Made by the John A. White Company.*

**T**HIS is a strong, well-made machine. Frame in one casting. Bed raised and lowered by hand wheel in front. All rolls positively driven by a very simple patented method. Cylinder belted on both sides. Feeds 30 or 40 feet per minute, as desired.

**DETAILS AND PRICES.**

	Will Work to Thickness of	Counters.	Revolutions.	Weight.	Price.
20 inches.	10 inches.	10 x 6	900	2,000	
24 "	10 "	10 x 6	900	2,000	
27 "	12 "	12 x 6	950	2,700	
30 "	12 "			3,000	

These machines are also made with matching and beading heads.

Price, extra . . . . . \$

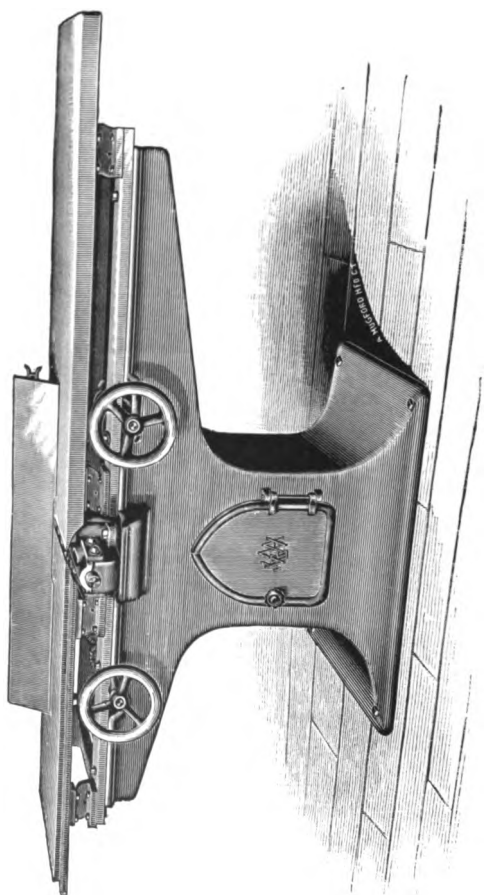
***Gordon Planer.****Made by the John A. White Company.*

**S**PECIALLY suited to light and fine work. Will plane from  $\frac{1}{8}$  to 8 inches thick. Four feed rolls, pressure bar, chip breaker, with improved weight attachment. For very fine work a rubber take away roll is substituted for the iron at extra price.

**DETAILS AND PRICES.**

	Will work to Thickness of	Counters.	Revolutions.	Weight.	Price.
12 inches.	$\frac{1}{16}$ to 8 in.	8 x 4	900		
16 "	$\frac{1}{8}$ to 8 in.	10 x 4	900		
24 "	$\frac{1}{8}$ to 8 in.	10 x 6	950		

*Concord Buzz Planer.*



*The Concord Buzz Planer.**Made by the John A. White Company.*

THE cut opposite represents our improved Buzz Planer. The frame is designed to give special rigidity, so as to secure proper operation, even when placed on an irregular floor. The cylinder is made of solid forged steel, and grooved for the attachment of special cutters, as desired.

Both tables are adjustable by hand wheels on the front of the machine, and may be moved 4 inches away from the cylinder in a horizontal direction. By an ingenious device peculiar to these machines, the steel lips forming the edges of the tables follow a circular path at a constant distance from the centre of the cylinder axis during adjustment, thereby giving the smallest possible amount of opening for the cutters when gauged for work. Every planer is fitted with our patent adjustable bevel rest and guide, which by turning one screw only may be set for any desired bevel, or removed entirely if desired.

The front edge of the back table has a rabbeting groove, by which rabbeting may be done to  $\frac{1}{2}$  inch, and to any desired width. These planers are made with 12, 16, 20, 24, and 30 inch knives, and with  $5\frac{1}{2}$ , 7, and 10 foot tables.

Tight and loose pulleys, 8 inches diameter, 4 inches face. Speed 800 revolutions per minute. Driving pulley, 24 inches; diameter 3 inches face.

**PRICES.**EXTRA,  
PER FOOT.

12-inch, $5\frac{1}{2}$ -foot table . . . . .	\$	\$
16 " . . . . .		
20 " . . . . .		
24 " . . . . .		

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